Centre for Resource Studies
Queen's University
Kingston, Ontario

Native Participation in Mineral Development Activities

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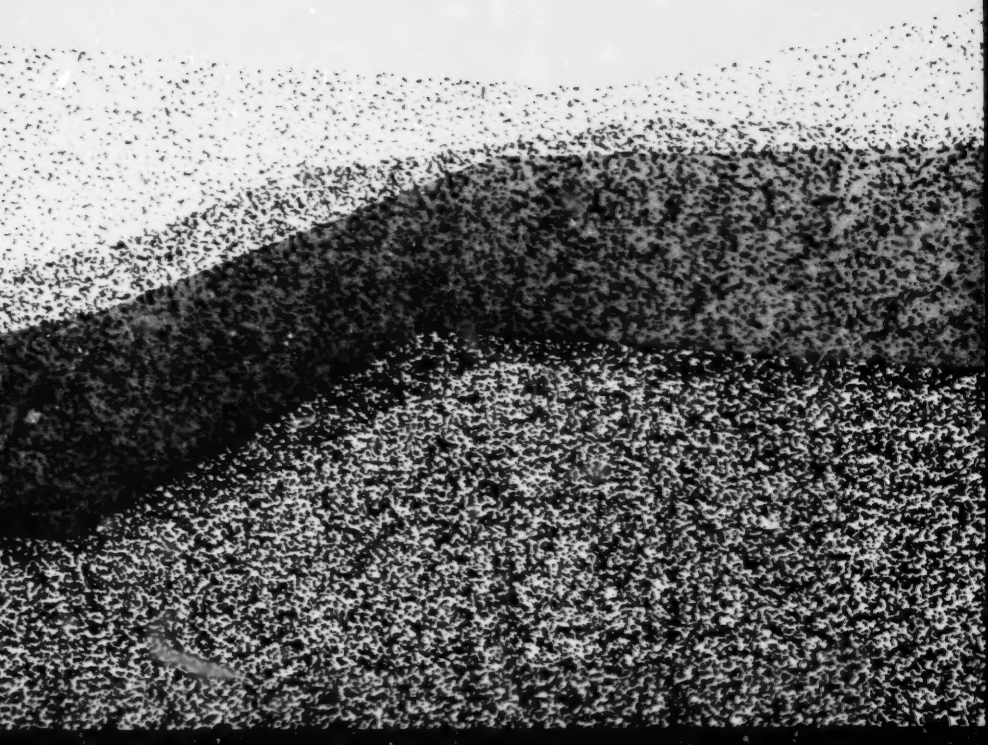

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NATIVE PARTICIPATION IN MINERAL DEVELOPMENT ACTIVITIES

Proceedings of the National Conference on Native Participation in Mineral Development Activities
Kingston, Ontario
March 27-29, 1984

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FOREWORD

This volume contains the proceedings of a national conference on Native Participation in Mineral Development Activities, held in Kingston Ontario, 27-29 March 1984. The conference was sponsored by the federal departments of Energy, Mines and Resources (EMR) and Indian Affairs and Northern Development (DIAND), with additional funding from the Canada Employment and Immigration Commission. Katherine Graham, a faculty associate of the Centre for Resource Studies (CRS), organized the program, with assistance from Margot Wojciechowski of CRS, Al Clark and Marc Lalande of EMR, Eugene Seymour of DIAND, and an advisory committee of representatives from government, native groups, and industry.

The Centre is grateful for the support of the sponsors, the assistance of the advisory committee, the papers and presentations of the speakers, and the contributions of all those who attended the conference and contributed to the discussions.

Views expressed are those of individual participants, and do not necessarily represent the views of the conference sponsors or of the Centre for Resource Studies.

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SUMMARY AND RECOMMENDATIONS

The National Conference on Native Participation in Mineral Development had two main objectives. The first objective was to undertake a practical examination of alternative approaches to native participation in mineral development. The assumption behind this objective was that mineral exploration and development activities will continue in Canada and that these activities will increasingly be occurring in areas inhabited by native people. With this in mind, it was thought appropriate to explore how natives might benefit from these activities. Indeed, this was the idea behind the original request from the Nishnawbe-Aski Nation to the Minister of State for Mines to support such a conference.

The second objective of the conference was to establish a common background of understanding among participants on such matters as the various attitudes and practices of native peoples towards mineral activities, and the practices of companies and governments regarding mineral development, in order to achieve the conference's first objective.

By the end of the three-day session, participants agreed that the conference succeeded in establishing a basis of understanding and in exploring the issues, to the extent that a start could be made at the conference on the examination of opportunities for native participation in mineral development, as well as recommendations for dealing with barriers to native participation.

Among the issues identified by participants as requiring further consideration were the following:

- differences in ownership of resources and control of mineral rights in various jurisdictions across Canada;

- differences in attitudes toward mineral development between and even within native organizations and groups;

- native groups' need for information about mineral opportunities, and for interpretations of the information that is available;

- mining companies' need to understand the interests and concerns of native organizations considering involvement in mineral activities;

- the role of government in facilitating contacts between native groups and companies in the mineral sector;

- the need for job-related skills and education for native individuals.

At the conclusion of the conference, participants agreed on five recommendations for follow-up activities:

1. an independent review of federal government mineral policy, as it relates to Indians;

2. clarification of federal/provincial issues relating to ownership of minerals on Indian reserves;

3. establishment of a native institution to gather information and provide expertise on mineral development activities to native people;

4. preparation of a handbook for native people, outlining the process of mineral exploration and development in Canada, and further sources of information;

5. a second conference or series of regional conferences on the topic of native participation in mineral activities, with greater emphasis on company/native interaction and less participation by government.

CANADA'S MINERAL ENDOWMENT

Al Clark and Marc Lalande
Mineral Policy Sector
Department of Energy, Mines and Resources

In this talk we will be covering a range of topics stemming from the theme 'Canada's Mineral Endowment'. Canada's Mineral endowment is a very large subject to be covered in any one talk and, as we will soon point out, is imperfectly known. At this seminar, we have participants with a wide range of knowledge about minerals and, in some cases, a local interest in mineral endowment. We will be trying to provide you with some basic information and advice on where to get more.

First, I will be taking about some resource concepts; then I will say a few words about actual mineral exploration activitiy in Canada. Finally, Marc will describe some of the federal and provincial sources of information on mineral resources.

Before starting an explanation of resource concepts, I would like to run through a fictitious question-and-answer exchange written by one of my colleagues, Dr. Jan Zwartendyk, that highlights the confusion that often accompanies questions about resource concepts. Imagine the following questions and responses, as an interviewer tries to find something out about the coal resources of an area.

Q.: How large are the coal resources in this region?
A.: 1,200 years' worth.

Q.: At growing levels of consumption?
A.: No, that would be only 250 years' worth.

Q.: Does that allow for future technological improvements in mining?
A.: No. that would stretch it to 350 years' worth.

Q.: Is that recoverable coal?
A.: No, that would be only 190 years' worth.

Q.: Is much of that economically recoverable now?
A.: No, only about 30 years' worth.

Q.: Can much of this be used for steel making?
A.: No, only 10 years' worth, but in view of the miners' strike ...

This parable illustrates some of the problems that can be encountered when talking about resources.

Resource Concepts

Among the most commonly used resource concepts are:

- resource base
- mineral endowment
- resources
- potential supply
- reserves.

This list is arranged with the term representing the largest amount at the top. In other words, each category is a subset of the preceding one. Let me quickly define each of them for you.

Resource Base

The resource base comprises all there is of the broad range of mineral elements, as they occur in their many chemical and physical states within the earth's crust, or within a specified part of the crust. It is huge, only vaguely known, and its exact size is fixed but not really of importance. This is because the resource base is a physical concept only, and is unrelated to real economics or technology. Actual mineral production represents only a negligible fraction of the total resource base.

Mineral Endowment

Mineral endowment describes certain modes of occurrence of an element (say, in sulphides) with a specified minimum grade, a minimum tonnage, and down to a maximum depth. It is the fraction of the resource base, or the physical envelope, beyond which our economic interests and technological capabilities do not reach, either now or in the foreseeable future. Mineral endowment is a handy concept for geologists, as it refers to a geologically-restricted domain, without specific economic or technological perspectives.

Like the resource base, the total mineral endowment is fixed. Although it represents only a small part of the resource base, it is still huge relative to mineral production activities, and is still very imperfectly known.

Resources

Mineral resources are those mineral concentrations within the mineral endowment, whether already known or still undiscovered, that are of economic interest or may become so in the foreseeable future. Resources are dynamic, changing with factors such as price, demand, and technological developments. They are determined by our economic interests and technological capabilities.

Like the two previous concepts, resources as a whole are very imperfectly known. We can only guess at the extent of undiscovered resources, and we have little incentive to acquire detailed knowledge about resources that are still subeconomic, i.e. too expensive to produce under present price and demand conditions.

Potential Supply

This represents the recoverable part of known resources and of those undiscovered resources that we expect to find with a specified exploration effort, at a given maximum exploitation cost. Potential supply, since it is potentially within reach, is smaller than the three concepts above, including total resources. This is because not all undiscovered resources are expected to be found; of those that are found, not all of the in-situ material can be recovered. Furthermore, not all resources can be recovered within the maximum exploitation cost allowed by present market conditions.

Like the others, potential supply is still very imperfectly known; and, like resources, potential supply is a dynamic concept, one which changes with our economic and technical outlook and capabilities.

Reserves

Reserves are the working inventories of mines. As such, they can be considered as the recoverable part of well-delineated, economic resources, i.e. part of potential supply. Reserves are conceptually dynamic, changing with

economic and technological factors governing what is economically mineable. They are also physically dynamic, being depleted by production on the one hand, and replenished on the other by new development.

Reserves are reasonably well known. Of all the concepts discussed above, only reserves are reliably quantifiable.

Mineral Supply

With the definitions now well in hand, let me now move to some related concepts. The main interest of this group is surely mineral supply, not mineral endowment, for it is through the supplying of minerals that wealth can be created and opportunities for employment and participation can arise.

Figure 1 shows a common misconception about mineral supply. Here, the existence of mineral reserves and resources is equated with their availability at any specific rate and time, and their changing and dynamic qualities are ignored. In this figure we can find the basis of many of the questions asked in the earlier parable.

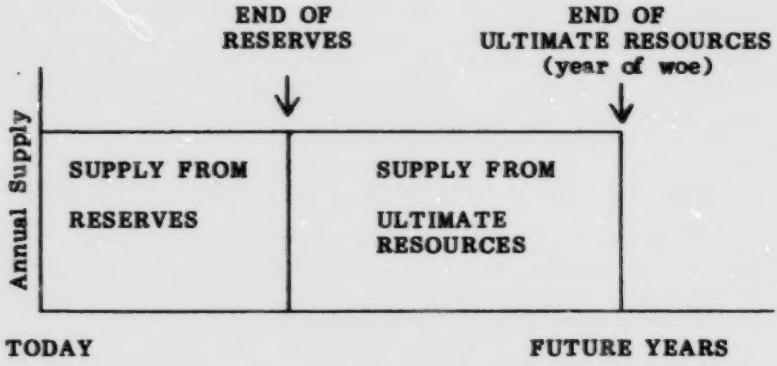

Figure 1. A common misconception about mineral supply.

At EMR, however, we look at resources from the point of view of a flow over time and our concept is shown in figure 2. The circle on the left in figure 2 represents the

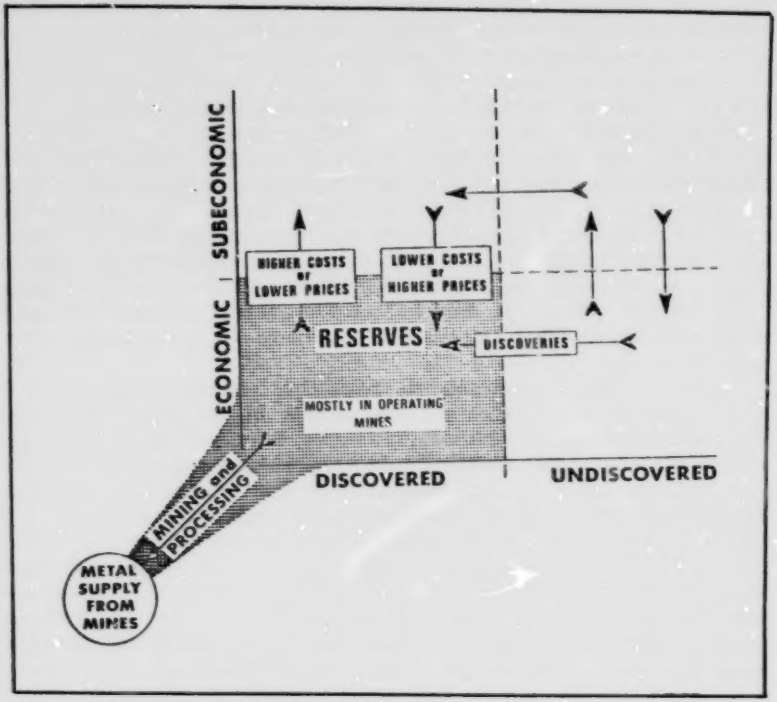

Figure 2. The flow of resources over time

metal supply from which money can be made. This supply comes from the dotted area, the boundaries for which are dynamic. The location of the horizontal dashed line is determined by metal prices at the cost of metal recovery, and is the subject of Dr. Mackenzie's paper. The vertical dashed line is determined by the amount of knowledge about what is in the ground.

Mineral Exploration

I would now like to jump from the world of definitions and concepts to the real world. I had intended to move across the country describing, in very brief terms, the thrust of past and current activities designed to move resources from

the undiscovered area on figure 2 into the discovered area: in other words, mineral exploration. What you would have heard was a repetition of the word gold. Exploration for gold is up dramatically all across the country. In general, the increase in expenditures for gold exploration balances the drop in exploration expenditures for other metals.

Two other related generalizations can be made. First, there is a decrease in activity by the major companies and an increase in activity by junior mining companies. And second, exploration is directed towards precious metals and massive sulphide-type base metal deposits leading to smaller, higher-grade mines. Seeing that many of you have local or regional interests, I refer you to the February issue of the Western Miner and the March 1 issue of the Northern Miner for details on current mineral exploration and discoveries.

Dr. Don Cranstone at EMR has studied exploration expenditures and rates of discovery in Canada. I have summarized some of his conclusions that you may find interesting. Dr. Cranstone finds that the average size of deposits discovered is decreasing, but the number of deposits discovered annually remains about the same. This implies that the value of metal discovered per year has also been falling. The discovery value per exploration dollar declined sharply for the 1978-80 period and, apparently, also for 1981-82. It is not clear whether this is a short-term phenomenon or whether it has serious implications for the long-term future of Canada's mineral industry.

In Canada, since the 1950s, some exploration effort has been directed towards areas so remote that, even when metal prices are favourable, only large high-grade discoveries could possibly prove to be viable. The strategy of some companies appears to have been to explore remote relatively unexplored areas in the hope of discovering a large high-grade deposit or, alternately, to secure a stock of mineral deposits for some future time when mineral commodities might be in short supply and prices high. Given the current market outlook, it seems more logical for both Canadian and world exploration efforts to be directed to areas in which infrastructure already exists and transportation costs will be relatively low, so that mine development costs will be much lower. This is why exploration expenditures in the north have dropped off so dramatically.

When discovery events are examined historically, it is evident that a relatively few mines dominate the amount of metal discovered. On a world-wide basis, a relatively small proportion of the world's mines yields a large percentage of the total metal output. Over half of the total 'gross metal

value' of the 900 metal deposits discovered in Canada over the period 1946 to 1982 arises from about 30 deposits, and over 80 percent of the total 'gross metal value' of all discoveries made in Canada over the same period occur in only 12 mining or mineral deposit districts.

Dr. Cranstone's analysis also shows that new geological concepts have led directly to the discovery of many orebodies in Canada. There are many different types of geological environments across Canada, some of which on the basis of current knowledge are considered to be barren. New knowledge may change this situation. Although Canada's mineral endowment is highly variable across the country, most regions already have some known minerals upon which a minerals industry can be based.

Types of Information Available on our Mineral Endowment

First, I would like to place this conference within a context of native people and minerals. An EMR publication entitled 'Native People and Mining', written by Glen Lazore in 1975, included a map that showed the geographical location of Indian populations, settlements, reserves and mining regions. These mining regions were defined in greater detail in another EMR publication called the MAPS Reports, which was produced in the mid-70s. Although we can assume that there has been some evolution over the past 9 years, the mining regions and the location of the Indian population remains essentially the same, and there is still considerable overlap of mining activity and potential in regions of Indian reserves and settlements.

Now to turn to other specific mineral information may be of use to you and is readily available. EMR produces reports and maps on mineral deposits that are updated regularly. For example, a map produced in 1980 shows the location of known but non-producing mineral deposits. In addition, these deposits are referenced in a publication giving details on the deposits, and there will be an up-to-date copy available this year. Another map, known as map 900A, which is updated annually, shows the location of all producing mines and what types of metals they produce. In the National Minerals Inventory, a division of Energy, Mines and Resources in Ottawa, there is a record of all known deposits, giving in detail the location, the description and the history of exploration and development of the deposit. These records are available in simple readable form for the asking, on a deposit-by-deposit basis.

Other reports and maps are available from the mines departments of the various provincial governments, which give information similar to the National Minerals Inventory.

Now, I think it would be a good idea to take an example of a real mining region, and see what types of information are available to allow you to investigate in detail the mineral potential of the region.

I have taken the Sudbury region as an example. First, we see it from satellite imagery. This picture was produced by the Canada Centre for Remote Sensing. We see here the Lake Wanapeti, Sudbury and the Sudbury Basin itself. The satellite picture clearly shows vegetation, rocks and forest cover. These satellite photos are available, as well as information on how to use them.

This map shows the exact location of Indian reserves in the Sudbury area. This next one is the geological map of the region, with all the mines clearly shown. The Province of Ontario produces many maps of this type, showing both mineral activities and the mineral potential of the region.

There are many other types of maps of various level of detail, as well as reports and other material, produced by the Geological Survey of Canada and by the mining departments of the provinces. All are easily available.

NATIVE PERSPECTIVES ON MINERAL DEVELOPMENT

Katherine A. Graham
Centre for Resource Studies

Introduction

It may seem strange that one of the first people speaking at this conference is a white person talking about how native people see mineral development. Presumptuous is one of the first words that might come to mind to describe this situation. When this conference was being planned, members of the planning committee decided that it was impossible to deal with specific subjects like employment programs, contracting, and financial arrangements for native participation in mineral development, without some common understanding among participants of the views of native people related to development. To be sure, everyone attending the conference has had some experience in dealing with native concerns related to development; however, that experience can be described as idiosyncratic. Accordingly, we thought it was best to try to have someone identify the range of native views and interests related to mineral development and to enrich that overview with the comments of panel members, and through general discussion.

Why Katherine Graham, you still might be asking. First of all, we thought that there was some merit in an approach which allowed native participants in the conference to see themselves as others see them. Second, through the Eastern Arctic Study and through other work that I have done over the past ten years, I think I have gained some understanding of native interests and views related to mineral exploration and development in Canada.

The specifics of this paper will deal with three issues:

- What native people want with respect to mineral development;
- What native people are doing to deal with exploration and development; and
- What are the needs of native people as they deal with development.

Before dealing with these specifics, however, I would like to make some general remarks about what I see as the shift in native perspectives over the past ten years. I

would characterize the development of native views on mineral development over the past decade as shifting from an ideological stance to a more pragmatic one. I think that most people here will remember the clarion call of the early to mid-1970s opposing mineral development. Particularly in Canada's north, native people were adamant that there should be no development before settlement of land claims.

Today, I see native people taking a carefully pragmatic approach to the prospect of mineral exploration and development. I say carefully pragmatic because I think native people still have a healthy skepticism about the costs and benefits of mineral-related activities. Nonetheless, they are willing to treat the potential for benefits as a serious matter and participate in projects to identify possible benefits for native people and to realize those benefits. Native participation in the expansion of the Norman Wells oil field and pipeline construction project is a case in point.

Even given this shift in attitudes, one still has to be sensitive about variations in the attitudes and understanding of native people related to mineral development. For example, there are differences in the level of sophistication that native people across the country have in understanding the practices of industry. As I imagine Brian Mackenzie will discuss, exploration activity is inherently different from development of a specific mine. Mines themselves may be shut down temporarily or permanently, depending on external factors such as world prices, or their inherent characteristics, notably the size of the ore body. Sometimes the shutdowns can be very traumatic, but other times they are planned with minimal disruption. One interesting finding of recent studies of mining communities in Canada is that the general population has a sometimes low level of understanding of mining company practices and of the economics of the industry. I would suggest that this is also the case among the native people of Canada.

I also see a wide variation in the level of interest among Canada's native people in participating in mineral development and exploration activities. To some extent, this may relate to whether or not a particular band or community has had previous dealings with mineral exploration and development. Previous dealings may serve to 'turn on' or 'turn off' interest in participation.

Finally, one must remain sensitive to the fact that there are variations in the level of enthusiasm that native people have for mineral development. Again, this relates to past experience. However, there are broader concerns that native people have related to the impact of mineral explora-

tion and development on renewable resources and on traditional lifestyles. In thinking about traditional lifestyles, it would seem that variations in levels of enthusiasm for mineral development may also relate to the extent to which traditional lifestyles are followed. Native people who already have a fairly firm attachment to the wage economy may see the economic benefit of mineral development more readily than native people who live in an area where they have been able to pursue traditional lifestyles and remain relatively autonomous. I think that such variations in enthusiasm are quite understandable.

What do native people want?

Keeping in mind comments about variation that I made above, I think it is possible to identify certain aspirations that native people have, related to the processes of mineral development and to participation in mineral development itself. I have consciously separated out the process of mineral development, meaning the planning, regulation, and monitoring of a particular endeavour, from objectives related to employment and other social and economic spinoffs from exploration and development. I have done this because I think that native people have found that they have had to balance their more political activities related to the process of development with their economic priorities related to participation in development. This has sometimes been a difficult task. I am not sure that I see it becoming it any easier.

At the political or policy level, I see native peoples' main objective as obtaining a worthwhile role in the planning and monitoring of mineral exploration and development. In recent years, the federal, provincial, and territorial governments and companies have made increased efforts to inform native people about prospects for mineral development that might affect them, and to involve them in planning and regulatory exercises. While these efforts have been well-intentioned and have certainly improved the ability of native people to make their views known, I think that there is some skepticism among native people about the extent to which these exercises actually influence the pace and nature of development or assist the cause of native people. Certainly, visiting communities in the north, one hears a common refrain that consultation related to development is time-consuming for the community, places social and economic burdens on the community, and is often meaningless in terms of its results. Nonetheless, native people

keep on participating in these exercises, hoping that they will be heard and that future planning, regulatory, and monitoring regimes will provide for more significant native participation.

Related to the desire for improved planning, regulatory, and monitoring practices is native peoples' search for a process which is understandable and predictable. It is relatively easy for a government or company planner to come up with a consultation program which is both elegant and adequate for company and government requirements. However, the role and nature of exercises such as environmental assessment reviews are not always communicated well to native people, with the result that they do not always understand them. As a result, the outcome of such exercises sometimes comes as a rude shock to native people. For example, there is a clear distinction between a regulatory exercise that is intended to determine the conditions under which a development will proceed from one which is established to determine whether or not a particular development will proceed. This distinction is not always clear at the time. The result is confusion during the exercise and, sometimes, disappointment at its conclusion.

I think it is fair to say that companies also are seeking a regulatory process which is understandable and predictable. Governments, for their part, are doing their best to improve the situation. However, I think that this is one area in which the onus for improvement is clearly on government. Having said that, I think it would be beneficial for native people and companies to lobby as strenuously as possible for the type of planning, regulatory, and monitoring process they desire. Government would probably be most receptive to constructive alternatives to the current process which are specific in nature rather than vague ideas such as the 'single window' approach which has been receiving a lot of attention recently.

Again being sensitive to the variations which I noted in my introduction, I think it is fair to say that native people are interested in the economic benefits stemming from mineral exploration and development. These benefits may come in the form of direct employment, secondary employment in spinoff industries, contracts, different types of compensation or royalty payments made to a community or band, or equity participation in a mineral venture. There is quite an array of these possibilities and this conference is designed to explore them.

I think that if economic benefits are sought through employment, native people would like some sensitivity to possible differences in their culture and to their approach

to the wage economy. For example, I personally might view working at a job which gives me a good wage as an end in itself, something that is inherently valuable. For a native person, I suspect that wage employment is often more of a means to an end. It not only provides the individual and his or her family with money for shelter and food, but also for other equipment which may often be dedicated to the pursuit of more traditional activities. If, for example, a native person wants or needs a new boat and motor, employment at a mine is an excellent way of obtaining money to get that boat and motor. Once the purchase is made, it is then possible to leave employment at the mine and go hunting, fishing, or trapping.

To my knowledge, studies of native employment programs and of native hiring at mines have generally indicated a higher turnover among the native workforce than among the non-native workforce. Very few of these reviews, however, go beyond that to determine why this is the case. I think that native people would like more sensitivity to the reasons behind native employment patterns. Some of these issues may be addressed in a study currently being undertaken by the Arctic Institute of North America and in the forthcoming study being requested by the Environmental Studies Revolving Fund. The Arctic Institute study is focusing on the training and employment of native people north of 60° generally. The Environmental Studies Revolving Fund study will concentrate on native training and employment programs in the oil and gas industry. Both may have results that are relevant to the south as well as the north.

Finally, any discussion about what native people seek from mineral exploration and development would be incomplete without reference to the social and economic costs of that development. Basically, I think that native people have a very high expectation that there will be social and economic costs from mineral development (which may often, in their perspective, outweigh any economic benefits). They also have expressed the view that there is some responsibility on the part of companies and the government to deal with these costs. In some jurisdictions, such as the Northwest Territories, the mechanism of socio-economic agreements has been adopted to commit a company developing a mine to carry out certain socio-economic activities intended to raise the benefits and reduce the costs of development to the local population. In my view, the process of developing these socio-economic agreements and similar remedial programs is still in its infancy. I think that native people are now beginning to experience the impact of these agreements as they relate to specific mines and that,

as a result of that experience, they may become more expert and more agressive in negotiating remedial measures.

What are native people doing about mineral development?

I see native people dealing with mineral development on two fronts, the economic and political. In both areas, there is a flurry of activity. On the economic side, we see native development corporations emerging such as Nunasi and Makavik. I see native people becoming more aggressive in their dealings with financial institutions; in some cases even setting up their own, such as Peace Hills Trust. Finally, I see an increasing number of native entrepreneurs who are servicing mineral development activities or even setting up their own mineral exploration companies. Entrepreneurial ventures are being undertaken by private individuals and by various native organizations. Shehtah drilling provides a good example of taking advantage of a specific project like Norman Wells, to set up and generate experience for a company specializing in a particular activity, while Ghost Lake Resources, owned by the Rae Edso Band, is exploring for minerals and raising funds on the public market.

I am also aware that native people are employed directly at mines and in exploration. This is certainly significant and may become more significant in the future. However, it may be that native employment in the mining industry will only increase significantly if there is a lot more attention paid to native aspirations for employment and the limitations that are sometimes imposed on native people by the absence of training facilities and programs near their homes.

On the political front, I see native people becoming more and more active in planning, regulatory and monitoring excercises. I see them becoming active in specific instances, such as the Beaufort Sea Environmental Assessment Review. In addition, and perhaps more importantly, I see them participating in ongoing planning groups. Increasingly, these groups are being set up by native people themselves or set up at the request of native people. I am thinking, for example, of Hudson's Bay Oil and Gas Committee, which is a committee of representatives of communities in the Hudson's Bay area dedicated to dealing with the possibility of oil and gas exploration in Hudson's Bay; and of the Development Impact Zone (DIZ) groups, which are being set up in other parts of the Northwest Territories under the recent Resource Development Policy promulgated by the Government of the Northwest Territories. All of these de-

velopments are important and require the attention of companies and governments as they go about their business.

What are the needs of native people?

In conclusion, I would like to suggest a couple of areas in which I think there is a pressing requirement for native people to improve their situation.

First, I think that native people would benefit from a greater understanding of industry practices in the exploration for mineral deposits and in the development of mines. Also, my sense is that native people have had little experience in dealing with the impact of mine closures. This is a difficult area for everyone but must be considered. I think that it has been legitimate in the past when native people have suggested that industry and government do not understand their needs or aspirations. To some extent the reverse is also true. Native people, for very good reason, have had relatively little exposure to the mining industry and to the full weight of government planning, regulatory, and monitoring practices. They now have some sense of these, but it can be an awesome burden to deal with a prospective development. I think that the next step is for native people to develop a more sophisticated understanding of industry practices and government requirements. With any luck, a conference such as this will contribute to this understanding.

The second area for which I see a high priority for improvement is in the training and education of native people to equip them with the skills necessary to participate in mineral exploration and development activities. To this point, there have been severe limitations on the accessibility of facilities and programs of the sort that will enable native people to obtain the skills and education necessary to participate in mineral development projects as skilled or supervisory personnel. In addition, the absence of schools and training facilities near native communities has forced most native entrepreneurs to learn as they go.

Both in the area of direct employment and in secondary activities, there have certainly been success stories. But there have also been failures. As Canada's mineral resources are developed, there will be increasing pressure to explore and develop in the more remote areas of the country. In some cases, these are precisely the areas which have the highest concentration of native people. Some of the difficulties that native people have experienced in the

past in dealing with mineral developments prompt me to suggest that it may be necessary for more native people to sacrifice themselves, even temporarily, in the cause of their people by making the effort to obtain skilled trades and managerial capabilities which will help their people realize more of the economic benefits of mineral development and suffer fewer of the economic and social costs.

ECONOMIC PERSPECTIVE OF MINING: DECISIONS FOR EXPLORATION, DEVELOPMENT, PRODUCTION AND CLOSURE

Brian W. Mackenzie
Centre for Resource Studies

Introduction

The purpose of this paper is to provide an economic framework for considering native participation in mining. This is done by examining the economic basis for mining decisions in terms of information requirements, methods of analysis, and decision criteria.

Economic Basis for Mining Decisions

Mining decisions concern the investment of people, time, money, mineral resources, and technology. This investment may yield information, productive capacity, lower costs, higher recoveries and revenues, and/or the supply of mineral commodities. Costs and risks are associated with the investment which is being contemplated in order to realize benefits, the most fundamental of which is the creation of new wealth for society. The anticipated costs, risks and benefits are shared in some way among the individuals and organizations participating in or otherwise associated with the investment decision.

The organizations responsible for taking these decisions, usually mining companies, have economic objectives. Therefore, mining decisions are based, in large part, on economic considerations.

What Does 'Economics' Mean?

'Economics' is simply a way of expressing and assessing the possible results of investment projects. Projects are evaluated to help select the best alternative or, in other words, the alternative which is most likely to satisfy objectives. In order to make this type of evaluation, it is necessary to look out into the uncertain future and estimate the costs, risks, and benefits associated with each alternative available at the present time. What is the economic value of each

alternative? Which is the best alternative? Is the best alternative good enough to justify investment? Economics is used as a common dollars-and-cents language to help answer these questions.

Special Features of Mining

Mining is somewhat different from other types of industrial activity because of problems and opportunities which arise from working with a geological environment. There are four special features of mining in this regard.

First of all, mineral deposits[1] are initially unknown, and thus must be discovered and delineated before the development of productive capacity can be considered. This feature explains the important role which mineral exploration plays in the mining sector.

Secondly, mineral deposits are fixed in size. This limits the rate of production which can be achieved from each mining operation and gives rise to a continuing need to explore. For each tonne of ore mined, there is one tonne less left to mine. Thus, mine closure is inherent in the mineral supply process.

Thirdly, there is a high degree of variation in geological quality both within and among mineral deposits. Thus, the economics of mining may be controlled using sequence-of-mining and cut-off grade strategies.[2] This feature also means that there is no such thing as a 'typical' deposit.

The fixed-in-size and varying-in-quality characteristics of mineral deposits are the reason for the wealth-creating attribute of mining. For economic deposits, there is a positive and highly variable difference between the revenues realized from mineral production and all the costs required to realize that revenue. This net value represents the in-

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1. A mineral deposit is a concentration of minerals having sufficient size and grade to be of potential economic interest.
2. Sequence-of-mining strategies concern the schedule or order of mining possible blocks of ore, having various average grades and mining costs, within a mineral deposit. Cut-off grade strategies concern selection of the lowest grade of mineralization which can be economically mined within each ore block. Ore reserves are the tonnage and average grade of that part of a mineral deposit which is above the selected cut-off grades.

crease in real wealth which results from investment in mining, rather than in some other economic activity.

Finally, mineral deposits are fixed in location, requiring that development, mining, and the initial stages of processing be carried out at the minesite. This feature gives rise to concerns relating to the provision of transportation infrastructure, native employment, and the planning of mining communities.

The economics of the mineral supply process is strongly influenced by these special geological features.

The Mineral Supply Process

Technical Activities

The economics of mining concerns the mineral supply process, a multi-stage series of technical activities by which minerals are converted from unknown geological resources to marketable commodities. The process is depicted in figure 1.

The physical occurrence of mineral deposits in nature and the demand for mineral commodities in the economy provide the basic stimulus for mineral supply. Favourable perceptions of exploration geologists and market researchers regarding these geological and market factors combine to guide the selection of environments for exploration.

The mineral exploration phase is a sequential information-gathering process. In the primary exploration stage, potentially favourable areas of land are initially selected within an environment of interest, and then these areas are subjected to a series of geological, geophysical, and geochemical tests. The successful result of primary exploration is the discovery of mineral occurrences. At this stage the ultimate size and value of each mineral occurrence is unknown.

The mineral occurrences discovered provide justification for the second, or delineation, stage of exploration, when information is provided for estimating the size, grade, and physical characteristics of the discovery relevant to mineral or metal recovery. The successful result of delineation is the definition of possible economic discoveries for evaluation.

When sufficient delineation work has been completed, a decision is made which determines whether a mineral deposit should be developed to production. If the characteristics of the delineated deposit provide justification for mine development, what is perceived to be an economic mineral deposit is the end result of mineral exploration.

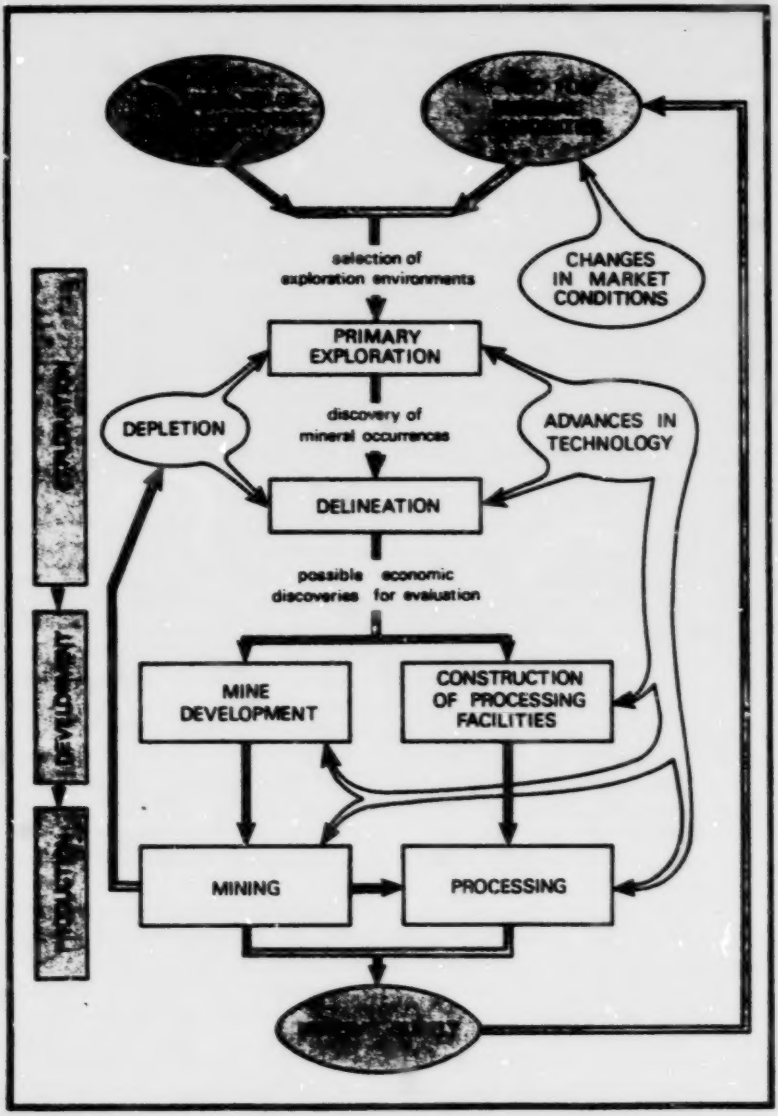

Figure 1. The Mineral Supply Process

The development phase establishes productive mining and mineral processing capacity. Processing is required to upgrade the mine product to a metal concentrate for transportation and sale. Thus, the construction of processing facilities is carried out in phase with mine development. The installation of a mill at the minesite may be required, or a common processing facility may be used to treat ores from a number of mines in a region.

When a mine has been developed and related processing facilities constructed, the production phase commences. The mining stage may include the stripping of waste for open pits, the preparation of stopes[3] for underground mining, the development of ore reserves, drilling, blasting, materials handling to the processing facilities, the filling of mined-out stopes, and associated technical and planning services. For base metal operations, which include the mining of copper, lead, zinc, tin, and associated byproducts, the processing stage usually consists of crushing, grinding, flotation, drying, tailings disposal, and the loading of concentrate products for shipment. In this way, the ore produced from a mine, which might contain 2 percent copper and 5 percent zinc, may be upgraded to produce a 25-percent copper concentrate and a 55-percent zinc concentrate, with the loss of 10 percent of the copper content and 20 percent of the zinc content in the tailings.

The end result of the mineral supply process as considered here is the production of metal concentrate at the minesite to satisfy market demand. Thus, market demand conditions include concentrate transportation and smelting and refining activities, as well as the sale of metal in the ultimate market.

The mineral supply process is dynamic. First, the market demand for mineral commodities changes with time due to a number of factors, including: varying requirements of existing end uses; changes in the properties and relative costs of substitute materials; the development of new product markets; and modifications in transportation, smelting, and refining conditions. Secondly, depletion, the physical exhaustion of mineral deposits, is inherent in their exploitation. Thus, continual exploration is required to sustain the existing level of mineral production. Furthermore, exploration, guided by geological concepts and skills, is a systematic process in the long term, tending to detect

3. A stope is an underground work area established for the purpose of extracting ore from a mineral deposit.

first those deposits that are largest, highest grade, closest to surface or closest to market. Consequently, the best easiest-to-find deposits will tend to be discovered, developed and exhausted first. Lower-quality, smaller, or harder-to-find deposits remain for the future. Thus, depletion causes the cost of mineral supply to rise over time. Fortunately, a third offsetting dynamic force is also at work: advances in technology. These advances may include more efficient and extensive exploration techniques, and improved mining and mineral processing methods. Advances in technology act to reduce the cost of mineral supply. The resultant of these market, depletion, and technological forces determines whether the economics of mineral supply are in fact deteriorating or improving with time.

Economic Characteristics

As outlined above, mining is a highly selective screening-down process. Starting with Canada's unknown mineral endowment, vast areas and large numbers of targets and discoveries are rejected, for each economic mineral deposit which is identified for development, production, and eventual closure. Selection is based on many sequential go/no-go decisions, each of which reflects perceived economic characteristics.

The economics of mineral supply comprises the costs, risks, and benefits of the three-phase process depicted in figure 1. Since the purpose of the process is to find and develop economic mineral deposits, these economic characteristics may conveniently be assessed with reference to an economic deposit.

Assessments of the costs, risks and benefits of mineral supply are applied to measure the economic attractiveness of the process. Economic criteria may be conveniently subdivided into long-term and short-term considerations. Long-term attractiveness is evaluated using measures of expected value. The short-term problems associated with realizing expectations are assessed by risk criteria.

Expected value measures the average value that mineral supply yields in the long term, when the successes and failures associated with a very large (theoretically infinite) number of discoveries are considered. Expected value criteria are derived from the time distribution of average cash flows for the discovery of an economic mineral deposit as shown in figure 2. The negative cash flows for the exploration and development phases represent the investments

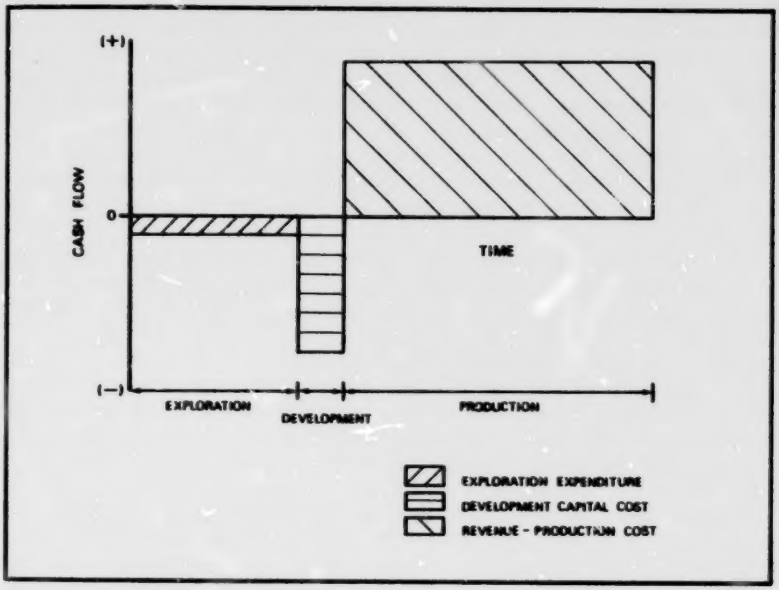

Figure 2. Time Distribution of Average Cash Flow for an Economic Mineral Deposit

required on average to find and develop an economic deposit. Positive cash flows are realized during the productive mine life as average sales revenues exceed average production costs.

For example, consider the following time distribution of average cash flows for an economic deposit in a hypothetical exploration environment.

Exploration: given a $2.5 million annual rate of expenditure, 10 years is required to find and delineate an economic deposit.

Development: the economic discovery then requires an investment of $30 million per year over a 3-year development period to install the necessary productive capacity.

Production : sales revenues of $25 million per year are realized and production costs of $7 million per year are incurred over a 10-year operating mine life.

In summary, average exploration expenditures of $25 million per economic discovery, followed by an investment of $90 million in mine development, yield a positive cash flow of $180 million over the productive life. Thus, the net cash flow of the three-phase mineral supply cycle is $65 million per economic mineral deposit. It is significant that the net cash flow is positive in this case, indicating that there may be economic justification for investment. However, note that a 13-year up-front period of investment is required before any positive cash flows are realized.

The type of cash flow assessment illustrated here is the starting point for evaluating the long-term economic attractiveness of mineral supply. Such an assessment should initially be made on a potential value basis, as shown in figure 2, including all direct costs and benefits. This provides the basis for measuring the productive capability of mineral supply to society. Subsequently, an assessment is made based on the situation for a particular organization, e.g. on an after-tax basis from the mining company's viewpoint.

The part of the cash flow distribution which is relevant depends on the type of decision which is being taken. Only the controllable future revenues and costs should be included. In any case, the cost of the investment funds required, termed 'the cost of capital', is imposed on the relevant cash flows to derive long-term expected value decision criteria.

There are three fundamental types of risk associated with the realization of these expected values:

i the sensitivity of the economics of mineral supply to metal price uncertainties. For example, while the revenue expected from the development of an economic mineral deposit may be $250 million, because of market risks we may only be confident that the revenue will be between $150 million and $400 million;

ii the uncertainty of the development and production phase cash flows (given the discovery of an economic mineral deposit), due to the geological variability of tonnage, grade, etc. among economic deposits. For example, while the expected or average cash flow associated with the discovery and development of an economic deposit may be $90 million, the cash flow of an actual economic deposit may vary from $5 million to $500 million;

iii the risk associated with the discovery of economic mineral deposits. For example, while exploration expenditures of $25 million may be required on average for the discovery and delineation of an economic deposit, an exploration investment of $70 million may be required to ensure success.

These risks, individually and collectively, present challenges to the long-term profit, survival and growth of organizations active in the mineral supply process.

Types of Decision Required

Several different types of decision have to be taken in order to progress through the mineral supply process.

In the exploration phase, a number of strategic questions must initially be answered: how much to spend? where to look? what to look for? how to look? As exploration proceeds, go/no-go decisions are required at the end of each sequential stage for the targets and projects identified. For each discovery being delineated, the key question is when to stop drilling.

The feasibility study work which is carried out for possible economic discoveries supports a mine development decision. Initially, the purpose of this work is to select a best set of project specifications for development and production, in terms of such factors as mining and processing methods, the capacity to be installed, cut-off grade, and sequence of mining. Then, a decision is required on whether the alternative selected provides economic justification for mine development.

For operating mines, decisions have to be taken with respect to equipment selection and replacement, productivity improvement, the possible expansion of capacity, short-term shutdown in response to adverse market conditions, and, ultimately, mine closure.

These decisions are internal to the mining company directly in charge of exploration, development, and production. Other decisions may have to be negotiated among organizations. These include agreement between an exploration company which has discovered a possible economic deposit and a mining company which is interested in participating in its subsequent development. The acquisition of exploration and/or mining rights, the participation of individual and institutional investors in mineral exploration and development, and mineral development agreements with appropriate provincial and federal government agencies, are other common forms of negotiated decision.

Irrespective of the type of decision required, each is based on the assessment of relevant costs, risks, and benefits. Economic evaluation techniques are applied to these estimates to provide suitable indicators of economic attractiveness.

Economic Evaluation Techniques

Economic Questions and Answers

Two economic questions usually have to be answered in order to provide the basis for exploration, development, production, and closure decisions.

1. Is this mining opportunity economic?
   (yes, no, maybe)

2. What is the economic value of this mining opportunity?
   ($ ____ million)

The first of these questions is pertinent to the internal type of decision. The second question is more appropriate for negotiated decisions. In both cases, answers are based on the perceived relationship between the return on investment and the cost of capital.

The return on investment is represented by the estimated time distribution of cash flows for a mining opportunity as portrayed in figure 2. This cash flow distribution may be expressed, in summary form, as a percentage annual rate of return on investment.

The cost of capital is the weighted average cost of investment funds, and includes an explicit interest cost (i.e. based on the actual interest rate payable) for debt financing, and an implicit opportunity cost (i.e. how much one might reasonably expect to make if the same money was invested elsewhere) for equity financing. This cost of capital is normally expressed as a percentage annual discount rate.

To answer the first question, 'is this mining opportunity economic?', the estimated rate of return for the opportunity may be compared with the cost of capital. A rate of return greater than or equal to the cost of capital indicates an economic opportunity.

To answer the second question, 'what is the economic value of this mining opportunity?', the cost-of-capital discount rate is imposed on the estimated time distribution of cash flows, and the net present value of the opportunity is derived. The net present value, a dollar amount, reflects

the intrinsic economic value of the mining opportunity and, as such, may be usefully applied in the negotiation of agreements.[4]

There are many uncertainties associated with the estimation of both the cash flow distribution itself and the cost of capital and, consequently, the economic evaluation of mining opportunities is uncertain. Thus, possible ranges of rates of return, costs of capital, and net present values are assessed. A mining opportunity is considered to be economic if there is deemed to be a 'reasonable chance' that the rate of return will at least equal the cost of capital. Thus, there are both expected value and risk dimensions to the economic evaluation carried out and the decision taken.

Economic evaluation techniques are common-sense methods, relatively simple to understand and apply. They reduce a complex set of future estimates to a relatively few indicators of economic value and investment attractiveness. This helps in making good decisions.

An important underlying concern when these techniques are applied is the gathering together of relevant experience and information for estimating the possible future conditions associated with the present decision being considered.

Information Requirements

The most important factor governing the validity of mining decisions is the quality of the information and estimates which are used for the economic evaluation of alternatives. The required level and reliability of data depends on the type of decision being taken. In general, information requirements may be grouped into five distinct subject areas.

i Geological information concerns the estimation of exploration expenditures; the geological tonnage and

4. It should be noted that the net present value criterion can also be applied to answer the first question. A net present value greater than or equal to zero is equivalent to a rate of return greater than or equal to the cost of capital. Both conditions indicate an economic mining opportunity.

grade possibilities of discoveries; the dip[5], width and depth of deposits; the variability of geological parameters within deposits; the mineralogy of recoverable ore reserves; and the strength and competency characteristics of the ore and host rocks.

ii Engineering estimates are required for the mining and processing methods to be used. These include mine recovery and dilution factors; milling recoveries; preproduction capital costs; and production costs.[6]

iii Market information includes an understanding of supply-demand-price conditions for the mineral commodities concerned; price forecasts; inflation and exchange rate estimates; smelter contract terms; and product transportation costs.

iv Financial data concerns the sources of investment funds for mining projects and estimation of an appropriate cost of capital to apply for the economic evaluation of alternatives.

v Required information relating to government policy includes federal and provincial mining taxation regimes; environmental control regulations; regional infrastructure incentives; mining community policies; and manpower programs.

How is this information obtained? The primary sources of most of this data are the mining companies directly responsible for the projects. Much time, effort and expertise is invested in providing a sound economic basis for exploration, development, production, and closure decisions.

There are also usually a number of useful secondary sources of information relating to mining projects, some of which are cited in the annotated bibliography. Also, consultants may be retained to provide the estimates required.

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5. The dip of a mineral deposit is the angle at which it is inclined from the horizontal.
6. The mine recovery factor is the percentage of geological ore reserves which is actually extracted. The remainder is left behind in pillars and remnants. The dilution factor, which may be expressed as a percentage of the geological ore reserves recovered, accounts for the barren or low-grade waste rock adjacent to the deposit itself which must be extracted in the mining process together with the recoverable part of the geological reserves. Milling recoveries allow for the incomplete recovery of the metal contained in the mill feed in the concentrate or impure bullion product.

However, there is really no substitute for approaching the primary source, the mining companies concerned, and talking to those with first-hand knowledge.

Cash Flow Estimation

The data elements discussed above are applied to estimate cash flows and provide the basis for the economic evaluation of mining projects. The integration of information and estimates for this purpose is outlined in figure 3.

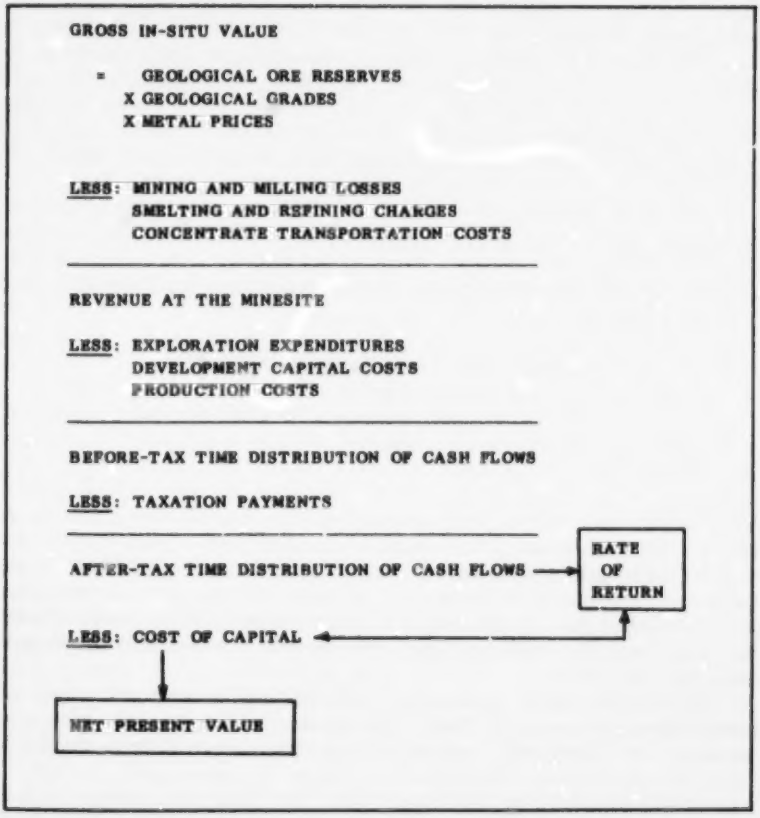

Figure 3. Cash Flow Estimation and Economic Evaluation

The value of a mineral deposit in the ground, termed the gross in-situ value of the deposit, is the product of the geological ore reserve tonnage, geological grades, and metal prices.[7] This is usually the type of value which is quoted in announcements of an 'X million dollar discovery'. Gross in-situ value gives a false impression of the economic value of a deposit, because all potential costs that will be incurred in bringing the minerals in the deposit to the market have to be deducted before a judgment can be formed concerning its real worth.

First of all, provision has be made for mining and milling losses. Part of the geological reserves inevitably has to be left behind in pillars and remnants. Also, the geological grades are diluted by the mining of barren or low-grade waste rock material adjacent to the deposit itself. Thus, the recoverable reserves delivered to the mill are usually significantly lower in grade and metal content than the geological ore reserve estimates. Then, mineral processing results in the incomplete recovery of the metal contained in the mill feed in the concentrate product.

In determining the value of this concentrate product, smelting and refining charges have to be deducted. While smelter contract terms vary, depending on concentrate grade, metal prices, etc., they generally include the following provisions:

- a unit deduction for metallurgical losses;
- a treatment charge per tonne of concentrate;
- a refining charge per tonne of contained metal;
- credits for precious metals;
- penalties for contaminants.

The combined effect of these smelter terms may be illustrated by expressing the value of metal contained in concentrate form at the smelter as a percentage of the metal price. Thus, the value of copper in copper concentrate might represent 70 percent of the copper price, and 50 percent of the zinc price might be paid for zinc contained in a zinc concentrate.

The deduction of mining and milling losses and smelting and refining charges from the gross in-situ value gives an estimate of potential revenue from the concentrate product,

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7. Geological ore reserve tonnage and grade ore estimated after the selection and imposition of a *cut-off grade* but prior to the application of mine recovery and dilution factors.

valued at the smelter. Concentrate transportation costs are then deducted to work the valuation back to an estimate of revenue at the minesite. Concentrate transportation costs are a function of road, rail, and ocean modes of shipment, concentrate volume, transportation distance, and the number of transfer points.

Revenue at the minesite usually represents the top line of a cash flow estimate for a contemplated mining investment. The costs associated with producing the concentrate then have to be deducted. These include the exploration expenditures required to find and delineate the deposit, the development capital costs required to install the necessary capacity, and production costs: the capital cost of major modifications, the sustaining capital required during the productive mine, life, and operating costs. The preproduction development capital costs normally include provision for:

- development of the mineral deposit;
- mine plant and machinery;
- processing facilities;
- infrastructure requirements for power, housing, townsite, and road facilities;
- working capital.

Operating costs usually include mining, milling, and overhead components.

The year-by-year deduction of the exploration expenditure, development capital cost, and production cost estimates from revenue at the minesite gives a before-tax time distribution of cash flows. This distribution will be negative for the exploration and development periods and, hopefully, positive over the productive mine life.

Taxation payments next have to be deducted. In Canada, these include provision for federal corporate income tax, provincial or territorial corporate income tax, and provincial or territorial mining tax. The deduction of tax payments yields an estimated after-tax time distribution of cash flows.

Finally, as previously discussed, an allowance is required for the cost associated with the investment funds which would be placed in the project, termed the cost of capital. This cost of capital, expressed as an annual compound discount rate, is the weighted average cost associated with debt and equity sources of funds. The cost of capital may be applied to the cash flow distribution, discounting the estimated future values back to a net present value. Alternatively, the cost of capital may be compared with the estimated rate of return for the mining project.

Small Gold-Copper Mine Development

Each mineral deposit has its own unique characteristics. However, the small gold-copper deposit evaluated here is intended to illustrate the cash flow estimation and economic evaluation procedures which have been described.

Let us imagine that this gold-copper deposit has been discovered and delineated, and is presently being considered for possible development. Based on expected value estimates, we would like to know whether the contemplated development is economic, and the economic value of the project.

All money values are expressed in constant 1980 dollars, i.e. exclusive of inflationary considerations. An 8-percent cost of capital is used as a best estimate of the weighted average cost typifying mine development investment funds.

The deposit has an estimated geological ore reserve of 300,000 tonnes, with average grades of 8.45 grams per tonne gold and 3.5 percent copper.

The following expected long-term metal price projections (in United States dollars) have been estimated:

copper	$1.00 per pound;
gold	$550 per ounce;
exchange rate	.85 U.S. $ / C $.

The fact that these market estimates, which seemed reasonable not too long ago, now may be considered too optimistic, illustrates the metal price uncertainties facing mining companies.

General net smelter return conditions for copper concentrate are used to work these projected metal prices back to a revenue estimate for the sale of concentrate at the smelter. Generalized costing relationships are applied, reflecting an order-of-magnitude level of accuracy, to estimate mill recovery factors, concentrate transportation costs, mine and mill capacities, preproduction capital costs, sustaining capital requirements, and operating costs.

An underground mining operation, located in Ontario, with the following specifications, is assumed:

- 300-metre shaft depth;
- 4-metre average deposit width;
- irregular open stoping mining method;
- 90-percent mine recovery factor;
- 15-percent mine dilution factor;

- availability of utility power;
- 2-year preproduction development period.

The deposit is assumed to be located close to established infrastructure. An existing townsite can be utilized. Existing milling facilities can be expanded to treat the ore mined. Copper concentrate would be shipped to the Noranda smelter.

Current federal corporate income tax, Ontario corporate income tax, and Ontario mining tax systems are applied. An individual project basis of taxation is assumed. A 10-percent per year general rate of inflation is used to assess tax allowances and payments.

The estimation of after-tax cash flow for this illustrative example is detailed in table 1. The gross in-situ value of the deposit is $80 million (or $267 per tonne). Gold represents 66 percent of this value, copper accounting for the remaining 34 percent. The after-tax cash flow is estimated to total $11.71 million after deduction of losses, processing charges, development capital costs, production costs, and taxes. This provides the basis for estimating the economic attractiveness of the proposed development.

Table 1

ESTIMATION OF AFTER-TAX CASH FLOW: SMALL GOLD-COPPER MINE DEVELOPMENT
($ million)

Gross in-situ value		80.00
Less:	Mining and milling losses	16.35
	Smelting and refining charges	7.24
	Concentrate transportation costs	1.10
Revenue at the minesite		55.31
Less:	Development capital costs	12.14
	Production costs	18.01
Before-tax cash flow		25.16
Less:	Taxation payments	13.45
After-tax cash flow		11.71

The after-tax cash flow of $11.71 million represents a 26-percent rate of return, in comparison with the 8-percent cost of capital. Thus, development of the gold-copper deposit under these circumstances would be a very profitable venture.

Further calculations let us express this result in terms of net present value at the start of development: $5.94 million, assuming the 8-percent cost of capital. Thus, the portrayal of this deposit as an '80 million dollar discovery' is extremely misleading, since its intrinsic economic value, $5.94 million, represents only a small proportion (about one-thirteenth) of the gross in-situ value. Nevertheless, a surplus value of almost $6 million on a $12-million investment, after the recovery of all costs including the cost of capital, is an attractive opportunity.

Thus, the development of the small gold-copper mine development under these conditions would certainly be economic. The economic value established can be used in exploration planning, for example, set to a maximum exploration expenditure limit which is economically justified to find and delineate such an exploration target. Alternatively, the net present value assessment can be applied, as in the following illustration, in negotiating agreements.

Negotiating an Exploration-Development Agreement

Suppose that a small exploration enterprise has been successful in finding and delineating the gold-copper deposit but has insufficient funds to finance its development. Consequently, the small company is considering farming the project out to a major mining group.

Although many types of farm-out arrangement are possible, the following rather simple terms agreement serve the purpose of illustrating the general effects of such arrangements. We assume that the major mining group would provide the development capital required; it would recover that capital from the first cash flows generated from the project; and subsequent cash flows would be shared with the small exploration enterprise.

The terms of the agreement are depicted in figure 4. Within this framework, the following questions have to be addressed. What share (Y percent) of the after-tax cash flows beyond the capital recovery period would the major mining group receive? Under these conditions, what is the net present value of the deposit to the small exploration enterprise?

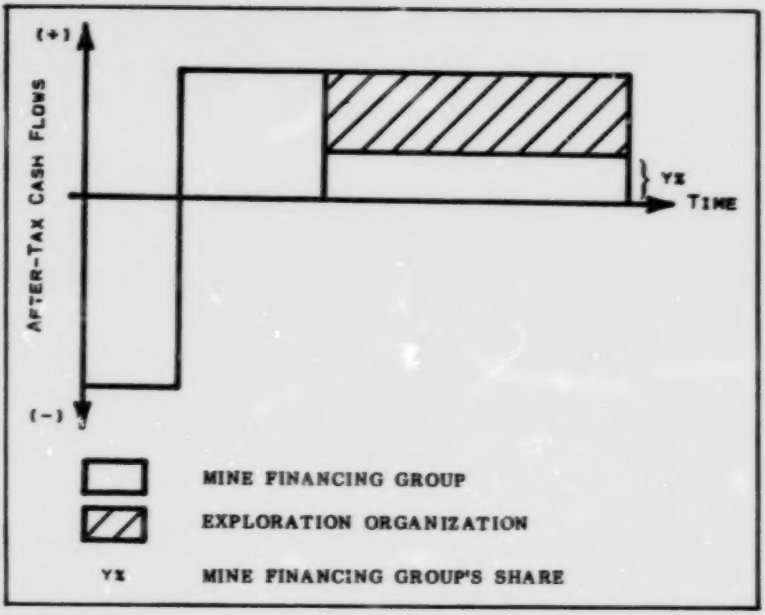

Figure 4. Assumed Farm-out Financing Agreement

The net present value of the gold-copper project at the start of development has been previously assessed as $5.94 million. Now, let us assume that the rate of return required by the major group for its participation in the project would be 10 percent, 15 percent, 20 percent, or 25 percent. The net present value to the small exploration company is still assessed using the 8-percent cost of capital.

Results are presented in table 2. For the 10-percent and 15-percent returns required by the major group, the small enterprise retains the major share of after-tax cash flows beyond the capital recovery period, and realizes the lion's share of the project's net present value. However, if returns of 20 percent or 25 percent are demanded by the major mining group, the position of the small exploration enterprise would be seriously eroded.

The illustrative results assessed here can be used to help establish a negotiating positions in structuring this type of exploration-development agreement.

Table 2

EFFECT OF FARM-OUT FINANCING AGREEMENTS: SMALL GOLD-COPPER MINE DEVELOPMENT

Return Required By Major Mining Group (%)	Sharing of After-Tax Cash Flows Beyond Capital Recovery Period		Net Present Value to Small Exploration Enterprise ($ million)
	Major Mining Group (Y%)	Small Exploration Enterprise (100-Y%)	
10	26	74	5.49
15	44	56	4.15
20	66	34	2.49
25	94	6	0.46

Conclusion

Mining decisions are fundamentally governed by economics. Native people wishing to participate in the mineral industry, whether as owners, partners, contractors, or employees, should have a clear understanding of the economic imperatives of the industry, the expected value and risk characteristics of mineral projects, the need to minimize costs in every aspect of the business, and the potential rewards that can be realized.

Annotated Bibliography

The following references are useful sources of information and case study examples pertaining to the economics of mineral exploration, new mine development, and operating mines and mineral processing facilities, with particular reference to Canada.

1. Mineral Facts and Problems
by the Staff, Bureau of Mines, United States Department of the Interior, 1980 edition, 1060 pp.

   Comprehensive commodity statements revised every five years for all significant minerals and fuels. Each commodity chapter includes descriptive and statistical information on industry structure, uses, reserves and resources, technology, supply-demand relationships, byproducts and co-products, strategic considerations, economic factors and problems, operating factors and problems, outlook, references, and other sources of information.

2. Canadian Minerals Yearbook
Energy, Mines and Resources Canada, 1981.

   Annual report on developments in the Canadian mineral industry. Preliminary summary published in February issue of Canadian Mining Journal, e.g. February 1984 issue reviews 1983. Includes general economic review, regional review, report on ore reserves, statistical report, company index, mineral map, and 44 chapters dealing with individual commodities. Commodity reviews cover Canadian mine development, mining, processing, exports, imports, and consumption; world developments; stocks; prices; technology; uses; and outlook.

3. Canadian Mines Handbook
The Northern Miner, Toronto, 1984-85 edition, 444 pp.

   Annual review of the mining industry in Canada by company including details on offices, directors, management, shareholders, properties, developments, production, ore reserves, sales contracts, exploration activities, and financial statement summaries for more than 2,200 mining companies.

4. Financial Post Corporation Service
Financial Post Corporation Service, Toronto.

A continually updated subscription news service, available in many government and university libraries. Basic information booklets and current information cards for all major Canadian companies. Source material includes balance sheets and income statements; per share earnings and equity figures; annual earnings and working capital series; and sales, production, ore reserve, and capital expenditure records.

5. National Mineral Inventory
Mineral Policy Sector, Energy, Mines and Resources Canada, Ottawa.

An open file of some 19,000 mineral deposit records compiled and maintained by geologists. Information available on large cards in standard format for each mineral occurrence including a narrative factual summary of exploration and development work, production (if any), a geological description, and details on location, ownership, and references. Computer printouts provide indexes and access pointers through the use of key characteristics.

6. The Northern Miner
Northern Miner Press Limited, Toronto.

Weekly newspaper of current events and commentary on Canadian exploration projects and results, mine developments, mining operations, and other mining company activities. Good source of technical, economic, and financial information on mining with emphasis on Canada.

7. 'An Analysis of Base-Metal Smelter Terms', P.J. Lewis and C.G. Streets, in the Proceedings of the Eleventh Commonwealth Mining and Metallurgical Congress, Institution of Mining and Metallurgy, London, 1978.

Worldwide survey and analysis of approximately 200 actual smelter contracts for copper, lead, zinc and tin. The structure of smelter terms for each metal is given, together with other detailed information, including possible penalty and credit payments. The information that should be contained in smelter contracts and the factors to be considered in their negotiation are discussed.

8. Mining and Mineral Processing Equipment Costs and Preliminary Capital Cost Estimations
A.L. Mular, Special Volume 25, The Canadian Institute of Mining and Metallurgy, 1982.

This handbook contains data in the form of graphs, tables and equations for order-of-magnitude estimation of capital and operating costs for open pit mines, underground mines, and mineral processing plants. Examples are given to illustrate the calculation of key parameters that determine cost.

9. 'Quick Guides to the Evaluation of Orebodies',
T.A. O'Hara, CIM Bulletin, February 1980, pp. 87-99.

Relationships are presented for order-of-magnitude estimation of capital and operating costs for open pit mines, underground mines, and mineral processing plants. Operating costs at different daily tonnages are related to orebody shape, mining method, milling process and general plant services. Capital costs are related to sizing of mining equipment, mine development, plant-site topography, climate and accessibility, plant services and personnel housing.

10. Mineral Industry Costs
edited by J.R. Hoskins and W.R. Green, Northwest Mining Association, Spokane, second edition revised, September 1977, 226 pp.

Includes chapters on mine valuation and feasibility studies, estimating the cost of development and operating of surface mines, underground mine development cost estimating, underground stoping and mining costs, methods for developing estimated costs for concentrating and processing facilities, price considerations, and financial analysis.

11. Mineral Industry Costs
edited by J.R. Hoskins, Northwest Mining Association, Spokane, 1982, 248 pp.

Includes chapters on the influence of geologic characteristics on production capacity and their relation to costs and profitability, mine evaluation, operating costs of a 100-ton-per-day underground mine, mining method cost comparisons, costs of small-scale gold recovery operations, detailed cost estimating for a mining venture, and mine finance.

12. Economic Guidelines for Small Mineral Deposits: Directives economiques relatives aux petits gisements
B.W. Mackenzie and M.L. Bilodeau, Working Paper No. 25, Centre for Resource Studies, Kingston, 1982, 66 pp.

Source of the small gold-copper deposit illustrations used in the present paper. Also evaluates a small copper-zinc-silver deposit and compares results. The effects of long-term metal price uncertainties and the timing of mine production in relation to short-term metal price fluctuations on the economics of new mine development are examined. The economic justification of exploration, and the determination of minimum acceptable exploration target conditions are also discussed.

13. Economic Mineral Exploration Targets
B.W. Mackenzie, Working Paper No. 28, Centre for Resource Studies, Kingston, 1984, 63 pp.

Analyzes the geological, cost, price, and taxation determinants of the economic viability of mineral exploration targets. Illustrations are drawn from mineral exploration experience in Canada. Initially, the methodology and data base employed are briefly outlined. Then, the economic characteristics of mineral exploration targets are evaluated, considering the effects of current taxation systems, changing and uncertain metal prices, the time trends in economic discovery rates and returns, and the traits of particular deposits types and exploration environments. The relative merits of zinc, copper and gold for the economics of prospective exploration targets are next evaluated. Then, minimum acceptable tonnage-grade conditions for economic exploration targets are assessed as a function of commodity, metal price, and remoteness. Finally, considering the time and cost required to find and delineate economic deposits, the overall economic justification for exploration is examined.

NATIVE PARTICIPATION OPTIONS: INFLUENCE AND CONTROL THROUGH NEGOTIATIONS AND THE REGULATORY PROCESS

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Factors Affecting Native Participation

As the title of this paper suggests, the topic is an extremely broad one. 'Regulatory process' is meant to refer to the myriad of steps through which a developer must go in order to obtain approval for the exploration, development, and/or production of a particular mineral. 'Mineral' is also used broadly here, and includes oil and gas as well as hardrock minerals.

The extent to and the means by which natives may participate in the mineral industry through negotiations or the regulatory process depend a great deal on a variety of factors. To properly set the context for my remarks, I will begin by outlining the main ones.

Which mineral is involved

This is important for two main reasons. First, there are generally different laws governing the exploitation of different minerals. Thus, oil and gas have tended to be more highly regulated, and subject to more public review processes, than other minerals. Second, the history, nature, and organization of the industries can differ depending upon the type of mineral with which the industry has been involved.

At what stage of a mineral project is involvement sought?

Generally, there is greater opportunity for involvement in the regulatory process at the back end of a project then at the front, that is, at the development and production stage rather than at the exploration stage.

In what jurisdiction is the activity to occur?

South of 60°, it is primarily provincial governments that have the regulatory authority over mineral development (one

exception is uranium, in which the federal government plays a key role). In western Canada, subsurface ownership tends to rest with the provincial governments, while the further east one goes, the greater the likelihood that minerals will be owned privately. North of 60°, the main regulatory role is played by the federal government, with the authority of the territorial governments being much more limited than that of a province.

Each of these jurisdictions has its own comprehensive set of laws and regulations, and while there is much similarity, 'access' points to the regulatory system do vary. Even where an activity is taking place in a province, in relation to provincially owned minerals, the federal government may nevertheless have a role to play. A good example is the authority that the National Energy Board has in relation to interprovincial and international pipelines.

Although I have tried to generalize about mineral exploitation laws, it is important to remember that specific questions about a particular project can only be answered properly by consulting the relevant laws of the jurisdiction in which the activity is to take place.

What native group is trying to participate in the mineral activity?

Canadian law draws distinctions between different types of natives, a fact that has led to a multitude of legal and other problems. These legal distinctions are extremely important in this context. For example, when a mineral activity is occurring on an Indian reserve, it is governed by the terms of the Indian Act, and its oil and gas and mining regulations. These require Band Council consent at certain points, and provide for leasing and royalty arrangements. This subject will be dealt with in detail by another speaker.

If the mineral activity is off reserve, and in the absence of a land claims agreement (such as the James Bay Agreement in Quebec) or successful assertions of aboriginal rights (as exemplified by the recently-announced Agreement between the Committee for Original Peoples' Entitlement (COPE) and the federal government in the Western Arctic), native people are generally in the same position in regard to participating in the regulatory process as are non-natives.

As I will discuss later, there are some situations in Canada where natives have been able to negotiate special arrangements with the mineral industry even though they

lacked recognized land rights. However, this is likely to be the case in only two types of situations:

i where natives have some land rights which are important to an overall project. Examples include Petro-Canada's Rim Gas project and Dome's LNG (liquified natural gas) project, both in northwestern B.C. In each case, Indian bands were able to negotiate broad rights in relation to an overall project largely because small parts of their reserve lands were required by the companies;

ii where governments having the ultimate authority to approve or disapprove a project are committed to special rights for natives in relation to a project, and through their policies are able to convince the industry in question to undertake particular obligations, such as those related to native employment and training. Examples here include the Cluff and Key Lake uranium projects in northern Saskatchewan.

What is the ultimate objective of native involvement in a particular project?

These can include stopping a project, participating in a project through employment or equity benefits, or influencing the way the project is carried out, in relation to social/economic/environmental concerns.

The balance of the paper includes an examination of means whereby and points at which natives may be able to become involved in the regulatory process, and some of the advantages and disadvantages of doing so. Next, I examine situations where it may be possible for natives to negotiate directly with companies, and some points to keep in mind when doing so. The paper concludes with some general observations.

The Regulatory Process

As indicated earlier, many aspects of mineral activities are highly regulated by government. While this is true in the sense that government permission is required for most things that the industries do, this is not to say that the opportunities for 'public' involvement are equally great at each stage of a mineral project.

The Exploration Stage

In order to conduct geophysical exploration (such as seismic studies), permits must be obtained from government. However, unless a surface owner other than the Crown is affected, such permits are relatively easy to obtain, with no opportunity for public input.

If surface disturbance is anticipated (such as drilling a well), rights to the underlying minerals must be obtained by permit, lease, or licence, from the mineral owner (either the Crown or a private owner). Here, too, there is unlikely to be much opportunity for public involvement.

There are some exceptions, however. North of 60°, it is the practice for the Department of Indian and Northern Affairs to consult a local community likely to be affected by an application for a land use permit. The purpose of this notification is to let the community know what is happening, and to receive its input into issues such as possible environmental damage. However, this is merely a consultative process, and the community has no power to veto a land use application. In Alberta, the permission of the Energy Resources Conservation Board (ERCB) is required before an oil or gas well can be drilled, and this can provide an opportunity for public input at a hearing. However, in most other jurisdictions, the decision whether or not to grant a drilling permit is a discretionary one which lies with government.

There have been a number of situations in the past decade or so when native groups attempted to stop mineral activities at the exploratory stage, through the courts. While the court cases, on the whole, were unsuccessful, in some situations the act of using the courts greatly increased the bargaining power of the native group. A few examples may help demonstrate the point.

In the early 1970s, the James Bay Cree and Inuit sought an injunction to stop the James Bay hydro-electric project. Although the court application failed before the Supreme Court of Canada, the natives were able to negotiate a comprehensive land settlement agreement, largely as a result of pressure from the court case.

A few years later the Inuit of Baker Lake, NWT, attempted to halt uranium exploration on the grounds that it interfered with caribou herds which, they asserted, they had the aboriginal right to hunt. Again, the court application failed. However, communication between the mining companies and the Baker Lake people improved in the wake of this litigation.

More recently, the Lubicon Lake Indians of northwestern Alberta unsuccessfully attempted to halt oil and gas exploration over lands to which they claim aboriginal entitlement. Nevertheless, their court application has brought much sympathetic publicity to their plight, and, it appears, has increased the likelihood of serious negotiations with the Alberta government.

This is not to suggest that litigation is always the best method of gaining involvement in the exploratory phase of mineral activity. However, there are situations where utilization of the courts seems to increase the willingness of industry and government to negotiate with affected native groups.

The Development and Production Stage

This is the stage at which a promising mineral deposit has been located, and when the terms and conditions of further development are being negotiated between industry and government, or are being reviewed in a public hearing.

It is at this stage that major changes have occurred over the past decade or so. A good example is found in the review processes pertaining to pipelines. Up to the early 1970s, the only hearings likely to take place were those of the National Energy Board (NEB). These hearings tended to be very formal and technical in nature, dominated primarily by lawyers. Nor did the Board have much expertise or interest in socio-economic or environmental issues.

A major change occurred after Mr. Justice Berger's Mackenzie Valley pipeline inquiry. This was a unique event, for a number of reasons.

1. The hearings were very open-ended, and public participation was encouraged through intervenor funding and mechanisms for obtaining information about the proposal.

2. Two sets of hearings were held: formal hearings that focused on technical matters, and community hearings at which local people where encouraged to present, in their own language and on their own turf, their concerns about the project.

3. The hearings specifically examined the issues of greatest interest to local communities, such as socio-economic and environmental input.

Since the Berger hearings, many mineral projects of concern to native peoples have been subjected to similar sweeping public reviews. Examples include the Cluff and Key Lake inquiries in Saskatchewan. The Berger techniques have also had a major influence on procedures followed in the federal Environmental Assessment Review Process (EARP). For example, the recent EARP hearings on proposed hydrocarbon development in the Beaufort Sea involved the public in setting the terms of reference for the environmental impact assessment, and, for the first time, provided funding for participation in the hearings by a variety of 'public' intervenors.

In many jurisdictions, then, there now exist public review processes of one kind or another pertaining to the socio-economic and environmental impact of proposed mineral projects. Participation by native people in such reviews has both advantages and disadvantages.

Advantages

1. Education

   - Of regulators: often government and those appointed to boards and tribunals have little or no knowledge or understanding of the particular concerns of native people. Once you have appeared before them, however, they will tend to remember you and will be more apt to take your concerns into account the next time.

   - Of industry: similarly, many members of industry know little about native cultures, concerns, and communities. Hearings can provide a formal mechanism in which to teach them at least a little.

   - Of yourselves: hearings provide a good opportunity to learn about both industry and government. This information can be very useful over the longer term as well.

2. Information: hearings can provide access to information about a project that otherwise might be difficult or impossible to obtain.

3. Organizational experience: your group will have to be well-organized to participate effectively in a public hearing. This skill can be useful in many other contexts as well.

4. Entitlement: often, native groups will be able to participate in hearings whether or not they hold recognized land rights relative to the project under review.

5. Funding: sometimes the hearing board or tribunal will provide funds to help your group prepare for the hearing.

6. Review of other projects: sometimes a hearing can provide a good opportunity for an in-depth examination of how other projects have worked out. For example, has the proponent company kept its commitments for native employment or training in relation to other projects?

7. Influencing the decision: often, intervention by your group in a public hearing will influence the terms and conditions put on the project by government. However, it is important to remember that not all hearing bodies have the actual power to decide whether or not a project can proceed.

Disadvantages

1. Time: effective involvement in a complex public hearing is very time-consuming.

2. Cost: if funding is not available, it can be very expensive to participate in lengthy hearings.

3. Technical nature of materials: the review can often involve highly technical matters, and reliance upon experts may be essential.

4. Go/No-Go option: as mentioned above, some hearing bodies do not have the power to decide whether or not a project will proceed, so participation may seem to be a waste of time.

Partly as a result of the various innovations that have taken place in the hearings in the past decade, the process has become increasingly lengthy. Industry has grown concerned about the time consumed in hearings, and also about the duplication of effort in different hearings concerning the same project. Lately, there has been much interest expressed about ways in which contentious issues might be resolved outside the hearing process, between industry and

the groups most affected by a project. The Dome agreement, discussed below, is at least a partial reflection of this trend.

Direct Negotiations with Companies

In considering when negotiations with industry may be an available option, it is important to bear in mind a few points.

First, not all companies are the same. Some are large, others small; there are those which are part of a multinational organization, and those which are relatively self-contained. Particularly with large organizations, it is essential to have communication with senior levels of management, because attitudes and policies tend to 'filter down' from the top to the operational level. While the establishment of a sympathetic relationship with someone more junior in the company will not hurt, it also may not be of very much help.

Second, there is still a great deal of ignorance in industry about native peoples. This varies greatly from company to company, of course, and it is true that some members of the mineral industry who have had dealings in the past with native communities are extremely well-informed. But it is important not to take for granted the existence of a pre-existing knowledge base when formulating your initial approach to a company.

Third, it must be borne in mind that the basic responsibility of all corporate managers is to maximize the return on investment to corporate shareholders. To facilitate financial planning, companies need certainty. For both of these reasons, it is important to communicate to companies the benefits that may accrue to them as a result of direct negotiations with affected native groups.

Given these basic characteristics, I believe there are primarily two situations where native people are likely to have an opportunity to deal on a face-to-face basis with the mineral industry.

Legal Entitlement

Where natives have a recognized land right in an area that is important to a mineral company, they are clearly in a strong bargaining position. Indians who live on reserves, for example, have certain statutory rights in relation to mineral development on their lands. Comprehensive land

claims agreements (such as the James Bay Agreement in Quebec) also grant legal rights that guarantee native participation in some circumstances.

Sometimes a fairly narrow legal right can provide sufficient bargaining power for the native group to negotiate rights much broader than might be expected. A good example is the agreement entered into recently between Dome and the Lax Kw'allaams Indian Band in northern B.C. Dome required a right-of-way across the reserve as part of its LNG project. The agreement that has been negotiated, however, goes far beyond the matter of a right-of-way. It contains obligations on Dome's part relating to fish and wildlife protection, training and employment of natives, camp policy during the construction phase, mitigation, and an overall compensation package. There are also mediation and arbitration procedures set out in the event of disputes between the company and the Indians. It provides a good precedent for a group that is embarking upon negotiations with a mineral company.

Government Policy

In the absence of a clearly recognized legal right, natives will have relatively little bargaining power with companies unless government policy dictates that a proponent make special arrangements with natives. What this suggests is that, in those cases where there is no clear legal entitlement, it may be preferable to exert time and energy on government, convincing key policy-makers in government of the importance of encouraging industry to come to grips with the concerns of affected natives.

Often, successful endeavors in this regard will not involve natives in face-to-face negotiations with industry, but rather will involve government negotiating with industry for native benefits. A good example is the surface lease granted by the Saskatchewan government to Amok Ltd. in connection with the Cluff Lake uranium development. The lease contains obligations relating to native training and employment, obligations that undoubtedly would not be there had the Saskatchewan government not been committed to such a policy.

Conclusions

What of the future?

Increasing recognition by government of native claims in northern Canada and other remote parts of the country will undoubtedly lead to more comprehensive land claims agreements containing specific rights for particular native groups in relation to mineral development. The recent aboriginal rights amendments to the Canadian constitution will be of great help in this regard.

However, even where native groups lack recognized land rights, industry's concerns about the time and cost involved in regulatory hearings may make it more amenable to face-to-face dealings with native groups affected by mineral projects. This tendency is one which government can encourage through the pursuit of appropriate policies.

MINERAL ACTIVITIES AND NATIVE INVOLVEMENT ON INDIAN RESERVES

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To cover the topic of 'Mineral Activities on Indian Reserves and Native Involvement' within the time allocated, I will be talking about:

- the source of advice available to native people within the Department, i.e. the Indian Minerals Directorates;
- the requirement of band approval prior to conducting mineral activities, i.e. the Band Council Resolution;
- mineral activities when an agreement with a third party is not required, i.e. our own exploration program;
- training and employment through in-house projects;
- prospecting on Indian reserves by non-Indians;
- the requirement of a mineral surrender when a third party is interested in acquiring the mineral rights beneath Indian reserves;
- methods of disposal, procedures for acquisition, and benefits derived;
- equity participation in mineral activities on Indian reserves;
- problems related to federal/provincial agreements respecting Indian lands.

Representatives of the Nishnawbe-Aski Nation identified issues last June that may affect the socio-economic and cultural life of native people, if the respective bands are not consulted and involved prior to any major mineral exploration/exploitation program taking place in their vicinity. Therefore, I would like to take this opportunity to offer my collaboration to Indian representatives invited to participate in the development of policies related to off-reserve mineral activities.

The Role and Responsibility of the Indian Minerals Directorates

Within Indian and Northern Affairs Canada, there are two directorates acting as consultants to the native people on mineral-related matters. One is referred to as Indian Min-

erals (East), and has been in operational existence since 1977. The other, Indian Minerals (West), was created in 1956, as a result of the oil 'boom'. Both offices are deployed units and are headed by a Director who reports to the Director General of the Reserves and Trusts Program in Ottawa. Each office is equipped with professional, technical and administrative staff to advise natives on mineral titles, rights and resources.

The Indian Minerals (East) office is based in Toronto, and is responsible for minerals on and/or beneath Indian reserves in Manitoba, Ontario, Quebec and the Maritimes. My counterpart, Mr. Jim Buchholz, heads the western office based in Calgary and his responsibility extends to Indian reserves located in the rest of the country. Input from both offices is coordinated through an administrative unit in Ottawa for on-the-spot information/advice required by the Minister. As part of the Minister's trust responsibility, our mandate is to identify, at band request, the mineral resource potential underlying and/or overlying Indian reserves.

It is, therefore, our responsibility to administer, under special ministerial delegation, and manage the exploration and development of these mineral resources so that their disposal benefits, to the maximum, (in terms of involvement, revenues and employment) the native people. The carrying out of this responsibility requires on-going consultation with the respective Band Councils. Prior to and during each phase of mineral activity, whether it is exploration, development or production, natives are involved and fully informed.

Band Council Resolutions

It is our policy to proceed with mineral activities on Indian reserves only on receipt of a Band Council Resolution. The band must express, through the quorum of its council and the use of a resolution, that it is interested in knowing about the mineral potential that may exist on and/or beneath the reserve. These resolutions are also required when a third party (e.g. an individual prospector, or a company) is interested in entering an Indian reserve for exploration and, if warranted, exploitation.

Band Council Resolutions are important because, in addition to being an expression of needs at the band level, they are tools that we use to plan our projects.

In all categories of minerals, Band Council Resolutions generate about 30 to 40 new geoscientific projects a year at Indian Minerals (East) alone.

Indian Minerals Directorates Exploration Program

Canada's approximately 2200 Indian reserves range in size from a few acres to some 350,000 acres, and comprise about 7,000,000 acres of land from coast to coast, not including the lands allocated to the Cree as a result of the James Bay Agreement. Their favourable geological environment in many instances, and the potential for finding minerals that could be extracted economically on any of these reserves, prompted the establishment of the following five stages of identification of mineral occurrences and deposits:

Stage I	literature research studies;
Stage II	field reconnaissance surveys or, subject to the size of a reserve, airborne surveys;
Stage III	detailed geoscientific surveys;
Stage IV	diamond drilling programs;
Stage V	feasibility studies.

At the end of these stages, if a project appears to be economically viable, a third party is invited, with the consent of the band, to pursue the project.

To conform to standard industry practices when referring to the various categories of minerals, both Directorates have specialists in the mining, petroleum and aggregate fields. For the sake of simplicity and to establish and maintain an inventory of the mineral potential on or beneath Indian reserves, the minerals are classified into three major categories:

i mining, which includes metallic (base and precious metals) and non-metallic minerals that are either mined or quarried;

ii petroleum, which includes oil, gas and related hydrocarbons;

iii aggregates, which includes sand, gravel and loose stones.

As a result of stage I, i.e. the literature research, each band is informed, with our advice and recommendations, of the mineral potential of their reserve. When follow-up is recommended, it then becomes a band decision as to whether or not to proceed with the next stage.

Although some reserves have gone beyond the first five stages, i.e. they are now at the development or production stage, others are at stage II, III, IV or V. It is important to note that our priorities in planning the follow-up stages are not necessarily based on the favourable results of the

previous stage; in all fairness, priority consideration is given to bands requesting our services for a less advanced stage.

As a comparison, while the private sector is focusing, as it should, on its goal of a producing mine, quarry, pit, or a productive well, the Indian Minerals offices, although they would like to achieve the same goal, have to determine whether the priority at the band level is a mine or the people; more often than not, it is the concerns of the native people that become the goal.

Prior to and after each stage beyond the literature research study, workshops are conducted for the band. They are aimed at informing the council and any interested band member of what has been done and what is advisable to do as follow-up. It is a very informative session, and in addition it maintains band involvement in the process of mineral identification.

As a result, the Band Council could at any time decide not to pursue a project, or could decide that a project should be postponed until all band members have been advised of activities that may take place on their reserve. The council then expresses the band decision through a Band Council Resolution, and so on, for each stage of indentification.

The Indian Minerals Staff Provides Training and Seasonal Employment During Projects

Most Indian people recognize their lack of understanding of the highly complex operations of the petroleum, mining, aggregate and peat industries, and see the need for increased and more comprehensive instruction. On behalf of the Nishnawbe-Aski Nation, Deputy Grand Chief of Grand Council Treaty No. 9, Mr. Bill Nothing, has identified this need: this national conference is the result.

While we are identifying the mineral potential through the various stages of identification, band members are hired to assist our field crews in establishing ground control grids and in conducting surveys. On a band-by-band basis, and with band collaboration, the professional and technical staff of Indian Minerals, through local workshops and on-the-job training, provides for an increased awareness of the 'technicalities' involved in mineral activities. We also organize and conduct mineral prospecting courses. The content of the course covers conventional prospecting techniques, in addition to describing the most common geoscientific surveys and related instruments. These courses

are usually two to three days in duration; half a day is usually reserved for the Provincial Mining Recorder to describe the procedures and techniques in staking and recording claims on provincial Crown lands.

In eastern Canada and particularly in the mining exploration business, there are quite a number of individual Indian prospectors. Although our mandate does not extend outside reserve lands, we are available to advise and guide those interested in exploring off-reserve prospects; we also provide free sample analysis, and our recommendations on the results.

Training and employment play an essential role, particularly within the mining industry, since such training assists native people in managing their mineral-related activities on their reserves, and equips them for employment in skilled trades as prospectors, geophysical operators, diamond drillers, claim stakers, line cutters etc., as well as positions in technological and engineering lines.

Procedures to Acquire a Licence to Prospect on Reserve

A person wishing to prospect on an Indian reserve must obtain a licence to prospect, available from either Indian Minerals office. A licence may be issued only for lands approved by the Band Council for prospecting, and the licensee must also be licensed (i.e. for off-reserve exploration) by the provincial authorities. The licence to prospect does not grant to the licensee any rights to the minerals which he may find while prospecting. We encourage Band Councils to approve applications for prospecting on their reserves, so that the mining industry becomes aware of any mineral potential.

Why a Mineral Surrender?

The term 'mineral surrender' evokes an unwelcome fear among native people; furthermore, it is a process not too easily understood by representatives of the industry. The word 'surrender' is simply the most appropriate legal term to define the consent of a band with respect to mineral exploration and exploitation on their reserve. The term 'surrender', when considered in its 'generally accepted sense of the word' rather than an 'administrative authorization by the band to the department', is by itself the most critical issue to mineral development that we, the natives, the industry and the department, are facing.

A mineral surrender is required when a third party (usually a company) is interested in acquiring the rights to the minerals underlying Indian reserves for exploration, and, if indications are favourable, for development and production. A band must surrender the interest it may have in the minerals underlying their reserve in order for the Minister to dispose of them at terms set by the Government of Canada and at conditions laid out by the band. Although a mineral surrender provides authority to the department to administer and manage the disposal of the minerals, the band is consulted and its consent is sought before proceeding with any disposal.

In most provinces, Indian bands have the right to use the minerals underlying the reserves and to receive compensation when they are disposed of. Since the beneficial interest a band has in its lands is a communal right, no individual band member may use the minerals for his sole benefit. Therefore, a majority of the members of a band have to give their permission so that permits and leases may be granted; it is another reason for the importance of a mineral surrender.

Now it becomes appropriate to identify the minerals that are and are not subject to this surrender process. Briefly, minerals requiring a surrender are those usually hidden from the surface, (e.g. base and precious metals, oil, gas and other hydrocarbons). Under present legislation, sand, gravel, stone, peat and other unconsolidated nonmetallic minerals do not require processing by surrender prior to disposal. Those nonmetallic minerals that are mined using underground, open pit or quarry methods may or may not require surrender.

Procedures Related to the Acquisition of Mineral Rights

Under section 57 of the Indian Act, the disposal of 'surrendered minerals' is governed by the Indian Oil and Gas Regulations P.C. 1977-1057 and the Indian Mining Regulations P.C. 1968-1865. These regulations provide for disposition by tender or negotiated agreement, rather than by the staking of claims, which is the method of acquisition off reserve. The minerals are then acquired through the granting of permits and/or leases. A permit is usually granted first and covers large tracts of land for exploration. Its term is usually one year, subject to three extensions of not more than one year each; further extensions are granted when judged necessary to complete exploratory work.

Under the Oil and Gas Regulations, the terms of a permit can be negotiated; otherwise, they are issued for one year, subject to two extensions.

A permit gives its holder the right to select a portion of the permit area for lease, but production is not allowed at this stage. The permittee may select a lease area, for development and production, from his permit area at any time. Then, under the Mining Regulations, a lease may be granted for a ten-year period (unless otherwise specified). The lease may be renewed for additional periods of ten years, providing minerals have been produced. Under the Oil and Gas Regulations, the lease term is five years (unless otherwise specified) and it may be renewed for additional periods of five years.

It should be noted that, prior to any third party entering onto Indian reserves to exploit the minerals acquired through a lease, it must make an application for the acquisition of surface rights; this requirement is also provided for in the respective regulations.

The sand and gravel guidelines derived from section 28(2) and 58(4)(B) of the Indian Act describe the procedures to follow with respect to the disposal of sand, gravel, loose stones and other unconsolidated nonmetallic minerals. The method of disposal is by agreement, and these minerals are acquired by the granting of short-term (90 days) and long-term (more than 90 days) permits. The Indian Act provides for the disposal of consolidated nonmetallic minerals for which the surrender process may not be required; they can be disposed of by tender or by negotiated agreement. Whichever method is chosen, a permit providing for a negotiated term with renewals is granted. For those minerals that may require a surrender, disposal is governed by the Indian Mining Regulations.

As in any negotiations, both parties have to 'give and take' in order that the outcome is a successful agreement acceptable and favourable to each one; therefore, the terms have to be fair and negotiable. In exchange for mineral acquisition, surface rentals (exploration and development phases) and royalties (production phase) have to be paid. The rates for 'surrendered minerals' are described in the regulations when they are disposed of by tender. If the 'negotiated agreement' method is selected, then the amount, as is the case for the minerals not requiring a surrender, is negotiated. Quite often in the oil and gas business, when the disposal is by public tender, bonuses are offered in addition to rentals and royalties.

Apart from financial considerations, we do look for a willingness on the part of the third party to train and em-

ploy local people, as well as their compliance with federal, provincial and local laws related to the environment.

Finally, the involvement of the band through consultation and information and/or as a partner in any, if not all, of the exploration, development and production phases, is one of the most important benefits we hope for in negotiating agreements.

Equity Participation in Mineral Activities as Applicable within Reserve Boundaries

The best way to be involved as I see it is to participate. The question is, when and to what extent, considering the high risk, should a band participate?

A band may form a corporation and explore its reserves independently. This corporation is considered a third party and will be granted permits and leases at terms set by the Government of Canada to ensure that the band as a whole will have maximum benefit from the disposal of the minerals.

Some bands have chosen this approach in the aggregates and peat sectors, because of these minerals are easily identified and proven. The problems encountered up to now have generally arisen at the band level, because the corporation benefits more than the band as a whole; quite often, the members of the corporation become more powerful than members of the Band Council. A solution to this problem that might be considered is that all band members should be members of the corporation (with provision to include the new-born).

This alternative of proceeding independently in the mining and oil and gas sectors requires in-depth consideration from all band members, because of the capital required and the lack of solid data on the mineral potential. It is not advisable for the 'have-not' bands, unless they minimize the risk by using the expertise within the mineral directorates to identify and prove the mineral potential prior to forming their corporation.

A band may also form a corporation and enter into a joint venture with another company to explore and possibly develop mineral prospects discovered on their reserves. They will share all costs and benefits according to negotiated proportions. On reserve lands, the joint corporation will still have to acquire the mineral rights under a permit and/or lease at terms set by the Government of Canada.

On reserve, it should be noted that any benefits arising from a joint venture would be in addition to negot-

iated bonuses, rentals, royalties, training, and employment. It may then be asked, why should a band share the risk of exploration? For your information, in eastern Canada, joint venture options have been negotiated for up to 30 percent in mining projects. There are only two gas agreements in eastern Canada, and neither has provision for joint ventures.

Federal/Provincial Agreement: An obstacle to Mineral Activities on Indian Reserves

Native people have recognized and are continuing to recognize the value of the mineral resources on or beneath Indian lands and the role which minerals can play in achieving economic self-sufficiency. As it now stands, the mineral resources on Indian reserves are explored and developed only at band request and the Indian bands receive the benefits in terms of involvement, revenues, and employment in accordance with the regulations and guidelines, and subject to federal/provincial agreements. Sometimes these agreements are in conflict with the requirements of the Indian Act and its regulations; in other cases, the provincial jurisdiction is a constraint to promotion of mineral development on reserve.

This latter problem could arise with respect to the agreements in Nova Scotia and New Brunswick, where the provincial governments own the mineral resources of Indian reserves. Therefore, it is theoretically impossible for the band to surrender its interest in the minerals as required by the regulations, and administratively impossible for the Department to grant permits and leases. However, these provinces concede that the regulations under the Indian Act are applicable, and that the Indian bands are to receive all benefits from mineral resource development as long as the band does not surrender all its rights and interests in the reserve and as long as the band exists. Clarification of the confusing interpretation of these agreements is part of the department's goal for the 1984-85 fiscal year.

There is no agreement with the Province of Quebec, which claims complete jurisdiction over mineral development once a band surrenders its interest in on-reserve minerals. We are presently establishing the departmental position so that an agreement can eventually be reached with this province, providing for full benefit to the native people.

In Ontario the terms of the 1924 Ontario Land Agreement provide that the province receives 50 percent of the benefits resulting from mineral activity on Indian

reserves, with the exception of some reserves for which the province's share has been waived. This agreement is being renegotiated by our department, with the aim being that the Indian people obtain all benefits from mineral exploration and exploitation.

In the Provinces of Manitoba, Alberta and Saskatchewan, the Indian people receive 100 percent of the benefits of mineral activities on Indian reserves under the provisions of the 1930 Natural Resources Transfer Act.

In British Columbia, mineral development of Indian reserves fall under provincial jurisdiction, in accordance with the 1943 British Columbia Indian Reserve Mineral Resources Act and Agreement. This agreement provides for a 50-50 split of the revenues from mineral development between the province and the federal Crown, the latter's share being for the use and benefit of the Indian Bands concerned. Although the Indian Mining Regulations are not applicable, a 'mineral surrender' is still necessary before development to ensure that it is in accordance with the Bands' wishes. As the benefits to the Indians under the 1943 agreement have been inconsequential, the department has been in the process of renegotiations of the agreement to secure improved benefits for the Indian people.

Summary

In summary, the major role of the department in mineral activities on Indian reserves is one of advisor, catalyst and mediator: as an advisor, in its capacity and capability to evaluate and identify the mineral potential; as catalyst, in its ability to inform and promote the mineral potential; and, as mediator, in its efforts to reach a fair agreement on the disposal of minerals. It should be noted that this role can only be played with maximum band involvement.

Further information may be obtained by directing your inquiries to the appropriate office.

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EQUITY PARTICIPATION IN MINERAL ACTIVITIES ON OFF-RESERVE LANDS

Franc R. Joubin
Consulting Geologist

Introduction

It is a pleasure to participate in your program, for several reasons.

I have spent fifty years as a happy and successful prospector, so I enjoy talking to interested persons on the subject. I particularly enjoy discussing the subject with native people because, over my long career and in many foreign countries, in central, South America, the African continent and the Middle East, I have always been closely associated with native people in this work. They were my guides and taught me much about their own wilderness areas of rain-forest, jungle or desert, as we would prospect together. There were many situations where I simply could not have carried on without them.

I have had many enjoyable associations with the Indian, the Inuit, and Metis people of Canada, from Vancouver Island to New Brunswick; from the Yukon to Ungava, and across the Northwest Territories. I am proud to say that I have been able to serve as a technical counsellor to Indian bands in British Columbia and in southern and northern Ontario.

Today, however, I have been asked to limit my remarks to native equity participation on non-reserve lands. This I judge to mean mineral prospecting opportunities elsewhere in Canada than on reserve lands. This may surprise some of you, as it does me, but I welcome the invitation with enthusiasm, because amazingly, any native person in Canada can become a licensed prospector and, if a discovery is made, stake and acquire it as his own. If the discovery responds encouragingly to development, that native person may sell it for a fortune, for himself or herself. All of this can be achieved by a native person on off-reserve lands, while I believe it be be extremely difficult, if at all possible, to accomplish the same upon reserve lands.

Becoming a Prospector

If any native person in this room, man or woman, or any other member back home on the reserve, who is eighteen years old, wishes to become immediately entitled to all the free-enterprise advantages of a non-Indian person, let him or her pay $5 for a prospector's licence and become an off-reserve prospector. Under the prospecting laws of any province, I believe, a native person can succeed more quickly off-reserve than on-reserve. This procedure is as follows.

Secure from the mining recorder's office of the mining district nearest to you a copy of the Provincial Mining Act and also the more readable summary of the act and the regulations. At the same time, if you wish, purchase a miner's licence and a number of metal claim tags for staking. At the same time, and often at the same source, secure township claims maps and geological maps and reports. Often the reports include useful advice to prospectors in regard to the district described. All of this literature is very reasonably priced. The entire collection on display here cost less than ten dollars. It is practically enough to put you in 'in business' - yet it is still a small fraction of all the maps and reports made readily available to the prospector, free or at low cost, by cooperative government agencies.

A prospector requires no formal training but should, initially, be field-taught by an experienced partner. A highly motivated individual, with keen sense of observation, assisted by an experienced partner, should master the practical aspects of prospecting during one week in an appropriate field area.

If no experienced prospectors are known to the native licenced applicant, then probably some would be known to the mining recorder who issues the licence and their names made available to you. Or you could enquire from the manager of the Prospectors and Developers Association of Toronto. That association, which includes over a thousand prospector members from all over Canada, exists to serve prospectors through educational services and as an institutional voice for their interests. There are similar associations based in mid-Canada and British Columbia. Some experienced prospectors would, I feel sure, be pleased to work with native partners.

Getting out in the Field

The ideal prospecting team is small; only two or three persons. When the team is formed, they should choose an area to prospect and select an outfit suitable to the area. It may prove practical, from both access and geological merit points of view, for native prospectors to start their prospecting careers on off-reserve lands but close to the reserves. Many reserve lands are situated upon, or close to, the 'greenstone belt' areas favoured by prospectors.

In the choice of an area, the maps you have acquired should help considerably. Some of the maps will indicate to you where earlier known mineral discoveries have been made and will describe the metals found. This is useful knowledge because in or near earlier discoveries is often the best place to find new ones. It is like fishing; usually the best place to fish is where the fish are jumping or being caught.

Such an area of earlier discoveries is useful for another reason. Examination of any old or new surface mineral showing is a good learning experience. You will quickly learn that there are certain easily identifiable clues. To mention only two of the many clues, probably the most common is called 'gossan', and consists of pink-red-brown rusty coloured streaks or patches in the ordinary bed rock. Then again white or glassy looking quartz with rusty spots may be present as streaks or sometimes a band a foot or more wide to form what is called a 'vein'. Examining older mineral discoveries, or even the weathered ore and waste rock from old mine dumps, can teach you a lot.

Then too, some of these old 'showings', which earlier were abandoned because the prices of the contained metals were too low at the time of discovery, may now be valuable. Gold for example has increased in value from $35 an ounce to over $350 an ounce in the past 15 years and silver has increased from $1 an ounce to over $10 in the same space of time. Some base metals, like copper, are lower in price at the moment, yet others like zinc are much higher. Often several metals occur together in the same ore; gold may be present with copper, and silver with lead and zinc, and there are many other combinations. The practical prospector searches for any and all metals at the same time, although gold is usually the most rewarding.

When the native prospector has acquired some experience, he can extend his searching beyond the known deposits near reserve lands. His licence permits him to prospect anywhere he wishes over Crown lands in the pro-

vince of issue, excepting only: Indian reservations; certain park lands; the mining claims of others; in settled communities; railroad and road lands; and cemetaries, church and school lands, etc. He may prospect in cultivated lands, but only with permission of the owners.

The prospector's equipment should be very simple, inexpensive and portable, in my view. Essentials are small axes, pick, matlock, a small 'gold' pan (serviceable also as a washing or cooking utensil), a magnetic compass (for direction and for identification of iron ores) a 10x magnification glass, new (plastic) sample sacks and a tag-book, and a black felt pencil. If water-ways are involved, use an easily inflatable rubber raft and paddles; a first-aid kit, small cooking outfit, fish-tackle and (if fowl or rabbit country) a small rifle. No mechnical devices. No motors and no electronic gadgetry, save possibly for a small battery-powered radio. The most effective prospecting teams can carry their complete outfits on their backs and will employ simple 'fly camps' for their two- or three-day moves. Not all exploration people will agree with this simple unencumbered approach, but it is the one I have commonly used and I have an outstanding record for making discoveries.

In ground-based reconnaissance prospecting, native person or otherwise, I prefer the emphasis be placed on human observation, curiosity, and resulting investigation, rather than mechanical, chemical or electronic gadetry. They can follow, after the prospector has put in sight an attractive block of 'float' (a loose, usually rusted piece of rock that shows mineral on a fresh broken surface) or, better still, has found mineral in a bedrock 'outcrop'.

However, the prospector is rarely the best judge of the value of mineralization, and often the trained geologist has difficulty as well. The final authority is the assayer. Every prospector, to succeed, must lean heavily upon the taking of samples or specimens of any mineralized rock that arouses his curiosity, place it in a clean sample sack, mark its location on the stub of the sample log number, and send it to an analyst or assayer for testing and a report. Your purchase of a prospecting licence entitles you to at least two free sample assays a year by the government's excellent laboratories. Two assays are not enough for energetic prospectors, so I suggest that you attempt to develop some understanding with a large mining company to perform more assays for you and at no cost. Many companies are ready to do this and would expect in return that you tell them where any high assay samples came from. This you can do, and in all safety, after you have staked one or more claims over the location of the sample source.

Staking a Claim

The manner of staking a mineral claim varies from province to province but is, in general, quite simple. In Ontario, claims in unsurveyed townships are each about 40 acres in size, are roughly square and with sides oriented roughly north-south and east-west. Each corner of the claim must be marked with a fence-post-sized log or tree stump blazed on four sides and on one blazed face is written the prospector's name, licence number and the time of day and date. A numbered metal tag secured from the mining recorder is also nailed to the post. The posts are numbered 1 to 4 on a clockwise basis and the same data is inscribed on each. The straight line distance between successive posts must be clearly marked, usually by blazes or spray paint on tree trunks.

A prospector in Ontario may stake as many claims as he wishes, in one block or several separated blocks. Claims may be staked to cover land and/or water areas. In staking, the prospector must respect and not over-lap the claims of an earlier staker, or a mining lease or a mineral patented property.

This briefly describes the staking procedure, but the applicable regulations should be read and followed to ensure compliance with all important details.

Registering a Claim

The prospector must register his staked claims with the appropriate mining recorder within one month of the staking day; usually the sooner the better to avoid complications with competitors. The registration is made on prepared forms with all staking details described and a map drawn by the prospector. If the prospector is staking in a surveyed township, his claimed area must conform to the survey plan of concession and lot lines and his corners should coincide with the survey corners.

At the time of registration, the mining recorder endorses on the back of the prospector's licence the claims newly staked, identified by their tag numbers, and the prospector is required to pay a fee of $9 for each claim staked. This, with the $1 he earlier paid for the claim tag that he nailed to the claim post, means that his cost per claim, other than his labour, is a very reasonable $10. In due course the registration form is processed, and the prospector's newly-staked claims are placed on a publicly printed claim-map for all to see. He then has an asset that he can sell or develop, subject to certain terms and conditions.

Assessment Work

Prospectors must, at any time of their choice during the first year after staking, perform, or have performed by others, 20 person-days of prospecting work on each claim, which is called 'assessment' work. This would normally consist of trenching, or blasting, or diamond drilling, to better expose the mineral indications that prompted the staking of the claim(s). If such work is done, and reported to the mining recorder on forms available for the purpose, the staker is allowed to retain the claim for another year. Similarly, if the staker does 40 person-days of assessment work in each of the second, third and fourth year, and 60 person-days of work in the fifth year for each claim, the staker may retain all the claims for a five-year period. If the staker fails to perform and record the assessment work in any one year, the claims lapse and revert to the Crown, and any other prospector may re-stake them.

Tie-on Staking

Normally, claims are not staked unless a mineral showing, old or newly made, is present at some point on the land staked. However, this is not a necessity, and claims are sometimes staked during 'a rush', simply next to, or near to someone else's discovery that appears to be important and attracting much public attention.

There is some justification for this 'tie-on' staking procedure. Mineral deposits usually come in clusters and often these clusters occur within or close to a major lineament that may be a certain rock layer, or a great fracture in the earth that is up to several miles in length. Such a fracture or structure may have a reasonably straight course or follow curving directions, and may form the 'stem' of the ore 'clusters'. Prospectors reason, and sometimes correctly, that any claims staked along the 'stem' may be found, by digging or other means, to have an ore 'cluster' present beneath the soil. To make matters easier for the prospector, such 'stems', called by the government mapping geologist 'regional faults' or 'shear zones', or 'stratigraphic horizons', often may be quite clearly marked on the published geological maps and serve as a useful guide to follow.

Disposing of a Promising Claim

Prospectors, native or otherwise, are not expected to find mines. They are counted upon however to find fresh indications of mineral on the ground which, if attractive, are staked and further exposed with some trenches (i.e. assessment work).

At some quite early point, if possible, during the first year, the prospector invites mining company 'scouts' to examine the 'showing'. The most successful inducement is to send the company scout a fist-size piece of mineralized rock, preferably freshly broken from its source. Many mining companies are constantly inviting prospectors to contact them in this manner through published advertisements.

The prospector may of course also send pieces of the mineralized rock to the mining recorder or to the government analyst, or the mining district's resident geologist, if there is one. These officials will provide, at no cost to the prospector, excellent technical advice which could be very useful. But if it is a practical economic evaluation you require, address yourself to the mining companies. Other useful contacts are the consulting geologists; they are specialists who work for several client mining companies at a time.

Do not be too discouraged if the first 'scout' appears disappointed with your 'showing' when he sees it in the field. Ask him how you can improve it. More digging? In what direction? After more work has been done, invite the same or another 'scout' to visit again and of course send him another piece of mineralized rock from the new trench you have dug.

If a 'scout' shows interest and wants to option your claims, then feel greatly encouraged but do not act too hastily. Never sign a written agreement without an intelligent friend's counsel and a lawyer's services.

Almost certainly any deal made will not produce much initial cash. Development options are the common form of agreement. These obligate the purchaser to make property payments on an installment basis as he simultaneously continues to spend much larger sums in survey, diamond drilling and other expensive development of the deposit. The developer will have the right to stop his development work and the due payments to the prospector at any time, if he feels his development results are not encouraging enough. However, if he allows his development option to lapse, the property reverts to the prospector again, without any cost even though much development money may have been spent upon it. Even such a development as this may not be

totally negative. Other companies with greater technical imagination and courage may wish to re-option the prospect and do even more work upon it, or the economics of the metals concerned may suddenly improve and change the entire evaluation of the deposit.

There is no standard form of agreement for the sale of mining claims; terms of such transactions are negotiated between the prospector/staker and the purchaser and must be considered with great care. Probably the best general terms for the prospector is a mixture of some modest cash payments and a continuing royalty in any producing mine.

Financing Prospecting Expeditions: Syndicates

In considering off-reserve prospecting you may well ask: how can native persons finance prospecting expenditions? The answer probably is: just as nonnative persons do, initially through prospecting syndicates.

Prospecting syndicates are legally identified small groups of probably twenty to fifty persons which provide the required sum of perhaps $15,000 to $25,000 to field a two-man team of prospectors for a three- to six-month prospecting season.

If a discovery is made and claims staked, the two prospectors would divide a 20-percent interest in the claims in addition to their earned salaries, and the financing group would divide between themselves the other 80 percent interest in the claim group.

Syndicates are popular because of their legal simplicity and short life. Many also offer considerable tax advantages to the money subscribers, because governments, through their taxation departments, wish to encourage prospecting.

To be readily financed, however, at least the senior prospector of the pair must have experienced and a reputation for competency. Native person prospectors should probably serve, for the first season or two, as junior partners in such a syndicate-financed program. By that time they should have the experience for public acceptance as senior and principal prospector for syndicate financing 'on their own'.

Conclusion

This should be the end of my remarks, but I cannot resist the temptation to end on a note of positive encouragement to every native person.

You are the people who live in and understand, better than any others, the wilderness lands of our country where the still unrecognized deposits of mineral treasure exist. If you will simply learn the few simple rules in recognizing mineral, you will find it.

Every time the wind uproots a tree, or a spring thaw exposes a fresh patch of rock in a stream, or a bush fire burns the shrubbery and moss away to expose more bare rock, or a bulldozer simply scrapes the earth, or you disturb the soil shovelling in your potato patch, look carefully with a prospector's eyes and you may find a fortune!

I strongly recommend that many of you consider making mineral prospecting your career in the off-reserve world.

It requires energy, motivation and patience, some limited training and a five-dollar licence to completely qualify you for this exciting career.

EMPLOYMENT OPPORTUNITIES

Earl Laliberté
Nunasi Corporation

Nunasi Corporation (formerly Inuit Development Corporation) is the business development arm of the Inuit of the Northwest Territories (NWT). Our area of responsibility encompasses about two thirds of the NWT and, in fact, is approximately one quarter of Canada's total land mass.

The company was incorporated in 1976 by Inuit Tapirisat of Canada (ITC), which is the 'mother' political organization, to investigate business opportunities in the north and to explore the possibilities of participating in existing and future development projects. The corporation is privately funded and its chairman and directors are all Inuit. Its board members are appointed by three regional organizations from the proposed Nunavut Territory in the NWT.

To date, our principal business investments have been in northern real estate, primarily office buildings and hotels, and administration of manpower service contracts in the mining industry. We have invested a lot of time investigating opportunities in the northern transportation business and we have recently acquired a majority interest in a small northern airline but we will be particularly involved in freighting rather than passenger service.

Another area where we have been successful, and that is directly related to the topic of this conference, is the mining industry. We were involved in two major mining projects in the north: Cominco's Polaris project in the high Arctic, (which is being billed as the 'world's most northerly mine') and the Cullaton Lake gold mine in the NWT, just north of Churchill, Manitoba. We financed the construction of the Cullaton mine, at a cost of $28 million. This was accomplished without equity capital, since we are 100-percent debt financed, but I will elaborate on that shortly.

One important consideration that comes into play when trying to get involved in mineral development activities is good timing. In both of the projects mentioned, Nunasi was involved in the very early stages: that is, before actual construction. It is very difficult to negotiate agreements with developers halfway through a project. As with any other business enterprise, budgets, construction deadlines and support services are planned well in advance. To negotiate an agreement, and in order to achieve anything of

significance, it is important to be involved during the planning stages.

When you are offering your services, regardless of any aboriginal entitlements you might have, it is important to be objective and question whether the proposal that is being presented to the developer can stand on its own merits. It is possible to receive certain benefits from a project on or near a reserve because of legal or aboriginal entitlements, but they are likely to be minimal. A company, logically, will look at the business viability of any proposal and there has to be 'something in it' for them. If a project is on or near a reserve, then you are in a good position to offer the developer a very legitimate service if for no other reason than the logistics, especially for services such as manpower recruitment. You are in a position to help the mine in their recruitment process: you live there; you know the people; you know who has the skills and where to find them. You are in an ideal position to set up support services because of your close proximity to the mine. These are all valuable assets and services a developer can use, and they can be sold. You are in an excellent position to propose mutually agreeable contractual arrangements, especially during the planning stages of development.

On the Polaris project, we were involved at the beginning and we were able to negotiate a one-year contract with Cominco to do all the recruiting for the construction of the mine. We also provided support services in terms of on-site and off-site counselling. We managed all transportation of personnel and accommodations and we administered the payroll, on site, which totalled $6 million for the year.

We recruited just over 400 nonmanagement personnel during that year. Our role, essentially, was to find the right people for specific jobs and arrange transportation to the mine site from all over the country. From the time we received a requisition we had only 3 days to get a worker to the site. It was agreed that northerners would receive first consideration at all times. However, we obviously could not find all the skilled workers we needed in the north so we had to recruit people from all over the country.

The mine had the right to accept or reject any job candidate whom we recommended, but, as we developed a working relationship, they rejected very few of our recommendations. The project, in fact, was completed 3 months ahead of schedule and, although we certainly cannot take credit for that, had we not provided qualified people and dispatched them efficiently, and had the project been delay-

ed, I am certain we would have shared part of the blame. It worked out well, since our contract was renewed with a mandate to hire the northern component during their operational phase. Generally, it was a very successful venture.

The Cullaton Lake gold mine deal that we were involved with 2 years ago was the largest single venture ever undertaken by a native group in Canada. Again, timing was an important consideration. When we learned that the developers were looking for financing, we approached our bank and then came up with an attractive proposal.

Since we had no equity whatsoever, in essence, what we did was provide a back-to-back loan. Nunasi operates on the basis of a loan guarantee from our affiliate organization, ITC, which is negotiating a multi-million dollar land claim settlement. On this basis, the bank provides us with a line of credit. Our loan guarantee at that time did not nearly cover the $28 million that was borrowed so, essentially, the bank's principal security was the mine itself.

A logical question to ask is, why did Cullaton not make the deal directly with the bank rather than involve a third party? The mine at the time, in fact, was negotiating with several banks. We simply came up with the right numbers. As well, they recognized the value of getting an Inuit group involved, particularly since they knew they had to meet certain conditions and objectives with respect to socio-economic matters in the NWT.

Further, Nunasi received 100,000 shares in the project, in lieu of a cash financing fee, and negotiated a separate manpower services contract similar to the Cominco agreement, although the gold mine is a considerably smaller operation than the lead-zinc mine at Polaris.

Economically, the mining industry has been taking a severe beating in the last 2 years because world market prices for minerals are at an all-time low. When the industry started cutting back, our contracts with both projects were not renewed, for austerity reasons. We had to tighten our own belts with respect to our operations, so we understood their problems. We sold our Cullaton shares last year when we thought the timing was right. The end result of this venture was a net profit of $3.9 million dollars.

Equally as important, because we were involved in the hiring process, we were able to maximize native employment on both projects. In terms of percentages, the native component of the total work force varied a lot depending on the time of year, but we were able to maintain an average of about 35 percent, which is about double the norm in similar northern projects.

To sum up, the mineral industry has proven receptive to the kinds of proposals I have been talking about, provided they have the confidence that an organization can carry them out. If you do not have the experienced resource staff in your area to negotiate and implement an agreement, then they can always be hired from elsewhere. The bottom line is that they would be working for you, and ultimately you have the control in terms of how you want your end of the contract to be carried out.

DIGEST OF DISCUSSIONS: CONFERENCE ON NATIVE PARTICIPATION IN MINERAL DEVELOPMENT

Introduction

The first three presentations of the conference were designed to explore the nature of Canada's mineral endowment, and to describe native and corporate perspectives concerning the development of the country's minerals. In addition, the presentation by Clark and Lalande began to give conference participants some idea of the nature of information available to the general public about Canada's mineral potential, and about prospecting and development work which is being done around the country. This presentation also raised the very basic questions about the accessibility and adequacy of information available to the various interested parties, about minerals and their development. The information issue emerged as a continuing one throughout the conference. Katherine Graham's paper and the formal response by Archie Patrick indicated the variation in attitude of Canada's native people toward mineral exploration and development. Brian Mackenzie's paper focused on the crucial economic decisions that are made by companies as they examine the viability of any deposit for development and production. When taken together, all three of these presentations enabled participants to identify three types of issues, each with its own opportunities and problems.

Issues concerning mineral exploration and development on Indian reserves

It may well be that hard mineral deposits or oil and gas exist on Indian lands. In some instances, the discovery of economic deposits can provide opportunities to bands and direct and indirect economic return. One avenue of assistance for bands in negotiating with third parties interested in developing on reserves are the two Indian Minerals Directorates of Indian Affairs and Northern Development Canada (DIAND), i.e. Indian Minerals (East) and Indian Minerals (West).

Assisted by John Goddard of Indian Mineral (West), Jean Luc Blais, director of Indian Minerals (East), outlined the services and methods of operation of the two directorates in assisting bands to deal with resource development issues pertaining to their lands. Although use of assistance such as that provided by the two directorates may

result in significant economic benefits to Indian bands, the extent of knowledge of the operation of these two directorates by bands is limited. This emerged as a key issue in the discussion. It was agreed that, in part, the limited awareness among Indian leaders about the services provided by the Indian Minerals Directorates is a reflection of the limited personnel resources that those directorates have. However, there also seemed to be consensus among those present that the directorates should make their services more widely known.

Chief Staats' presentation about the Six Nations Band's experience with the extraction of gypsum from its reserve illustrated some of the difficulties faced by bands who are having to live with a lease agreement negotiated in the past which may not meet current band needs. In part, it was agreed that some of the difficulties associated with old leases relate to confusion in the federal-provincial relationship related to resource development on Indian land. As Jean Luc Blais pointed out, in the provinces of Manitoba, Alberta, and Saskatchewan, Indian people receive 100 percent of the benefits of mineral activities on Indian reserves under the provisions of 1930 Natural Resources Transfer Act. In other provinces, the percentages of benefits received by Indians varies and in two provinces, Nova Scotia and New Brunswick, it is theoretically impossible for a band to surrender its interest in minerals, and administratively impossible for DIAND to grant leases or permits to third parties.

Another important issue which emerged concerning mineral development on Indian reserves is the question of individual versus group benefits. Reserve lands are held by a band on a communal basis. Accordingly, no individual band member may exploit minerals on the reserve for his or her sole benefit. As Franc Joubin indicated in his presentation, this means that it would be most advantageous for an individual Indian prospector to explore off reserve in order to realize individual economic benefits. On the other hand, the fact that reserve land is communal means that all band members must benefit from whatever compensation is received when minerals on the reserve are developed. This can result in considerable economic prosperity for to a band.

However, the key to achieving such prosperity, as Chief Staats and other participants pointed out, is a good leasing arrangement with whatever third party may want to develop the mineral deposits on a reserve, or some other sound basis for financial participation in the development by the band. Equity participation through a band-run corpor-

ation was explored as an alternative approach, resulting in greater band control over the pace and nature of development, as well as possibly resulting in improved band compensation. Participants recognized, however, that equity participation required detailed study by each band before any corporate structure is established to enter into the exploration or development business.

Issues concerning the territories north of 60°

The presenation by Terry Daniels concerning the establishment and operation of Ghost Lake Resources, a development corporation of the Rae-Edzo Band in the Northwest Territories, served to illustrate an example of a successful band corporation. It also served to supplement the Clark/Lalande, Graham, and Mackenzie presentations by pointing out some of the particular circumstances related to native participation in resource development in the territorial north.

Participants observed that, unlike in the provinces, the territories do not have an extensive reserve system, even though they do have Indian bands. There is only one reserve in the Northwest Territories while there are seventeen Indian bands. Although there are few reserves in the territories, extensive tracts of land are subject to comprehensive native claims by various Indian groups and by the Inuit of the central and eastern Arctic. The Inuvialuit of the western Arctic have recently negotiated an agreement with the Government of Canada for a specified territory which will have implications for mineral exploration and development.

The existence of comprehensive native claims in the territories is only one aspect of the political scene there. In both the Northwest and Yukon territories, there is a push to achieve responsible government. In the NWT, there is the additional question of how the territory might be divided in the future. These and other issues preoccupy northerners and non-northerners. They also make mineral exploration and development subject to different approaches to planning, regulation, and monitoring than are taken in the south.

Issues concerning the rest of Canada

Once one moves below the 60th parallel, issues related to mineral development on and off Indian reserves become con-

founded by the federal-provincial difficulties discussed above. In addition, participants agreed that the general attitude of individual provincial governments can strongly influence the context of native involvement in mineral development. Participants noted that some provincial governments have required formal social-economic agreements from mining companies wishing to undertake certain programs, in order to spread the direct and indirect benefits from a mineral development to native people. Such agreements are in use in the territories and have been used in Saskatchewan. In contrast, other provincial governments have no formal requirements regarding native benefits from mineral activities.

Participants agreed that it is necessary to distinguish between situations where native people comprise the majority of residents in an area subject to development, such as northern Saskatchewan, and where they are in a minority position, such as in the Hemlo area of northern Ontario. It may be that the size of the native population relative to the non-native population may be more important in generating a company and government commitment to provide direct and indirect benefits to native people from mineral development than is the existence of a large Indian population per se.

These types of issues all arise in an environment which exhibits important variations in the attitudes and practices of native people, companies and governments.

Reflecting on the comments by Katherine Graham, Archie Patrick, Terry Daniels, and Chief Staats, participants observed that native attitudes toward mineral development range from favouring development to being unconditionally opposed to development on the grounds that it is disruptive to the natural environment and that it is accompanied by high social costs. There was general agreement among participants that native people who are in favour of development are generally seeking the economic benefits which might result to them, either as individuals or as members of a band or group.

In thinking of those who are opposed to development, the distinction was drawn between those who oppose development in the hopes of bargaining compensation or some benefit package and those who are opposed on the fundamental grounds that the environment and traditional life of native people will be damaged. As one native participant suggested, there might be a need to distinguish between what native people demand and what they need.

It was also recognized that there was a wide variation among mineral development companies in their knowledge of native people and in their willingness to voluntarily under-

take special measures to encourage direct and indirect benefits for native people from development.

In her presentation, Connie Hunt illustrated the lack of knowledge by some very large corporations about native concerns and the structure of native organizations which might want to discuss companies development plans. Participants agreed with Hunt's suggestion that native people must educate industry about native interests, structures, and then work hard to generate senior company officers' commitment to meeting native concerns and interests.

In many Canadian provinces, the provincial government does not automatically require any formal company commitment to special programs or other initiatives to ensure native benefits from mineral activities. In this environment, it was agreed that some companies will be more forthcoming than others with such responses to native interests. Discussion of the presentation by Ken Hill on Detour Lake suggested that companies will learn by experience, even when they are not required to make any formal commitment to government to hire natives. For example, Dome Mines voluntarily agreed to hire as many native people as possible and is funding 80 percent of the cost for Treaty 9 to hire a native employment coordinator for the development. Based on tha experience, Dome Mines has identified the elements for a successful native employment program at the mine more specifically than it had in the early stages of development.

In general terms, the needs identified by Ken Hill were for native employment coordinators, transportation programs for people living in remote areas, and cultural workshops to help supervisory personnel and native personnel alike in dealing with one another.

The elements identified by Ken Hill were similar to the basic building blocks of the direct native employment program operated by Amok Ltd. in northern Saskatchewan and by Dome Petroleum in the Beaufort Sea. These programs, plus measures used to generate spinoff employment were presented by Rosemary Karnes of Dome and by Clare Gitsall and Lyle Bear of Amok. In both northern Saskatchewan and the Northwest Territories, the companies involved are governed by formal government agreements regarding native participation. From the presentations and subsequent discussions it was clear, however, that the two companies involved see a very real benefit from programs they have instituted. For example, both Amok and Dome have designated suppliers for items such as caps, certain food items, and coveralls from specific communities in the area in which they are operating. This not only creates direct employ-

ment (often for women in the communities who perhaps cannot perhaps leave home to work at the mine or exploration site); it also guarantees a supply.

The role of government was a recurring theme in all the discussions about variations in the attitudes and practices of native people and companies. Some participants were of the view that any special native employment programs required a strong government commitment to get them going and comprehensive government monitoring systems to make certain they work. While other participants may not have seen the need for extensive government intervention, it was generally agreed that basic government policy (be it federal or provincial) regarding resource development sets the stage for native involvement.

Despite this, and despite the variations in Canadian governments' aggressiveness in ensuring native benefits, conference participants generally were of the view that direct dealing between native people and companies should increase. More direct communication between native leaders and senior mining company officials was thought to generate a greater mutual understanding about perspectives concerning mining and oil and gas development. Direct contact was also seen as a more effective way of working out problems than using government as an intermediary.

Perhaps the basis for the suggestion that there should be more direct company-native dealings lies in the fact that companies and native people themselves will be the initial recipients of benefits from native participation in mineral development. To be sure, governments will also benefit from native economic participation, possibly through increased revenues from taxes, possibly through less native reliance on government programs for support, and through other means. However, it is companies who will benefit from a readily available supply of labour, competitive service and supply contracts, and the good corporate image that may result from successful native involvement in a development. Such a good corporate image may make future development proposals in areas inhabited by native people more readily acceptable. For native people, the direct benefits of participation include the potential for improved incomes and the development of special skills which may be useful both in and outside of the work place.

Where to go from here

Starting from a general consensus concerning the issues related to native participation in mineral development, par-

ticipants in the conference were then able to agree upon certain needs and recommendations: the needs were generally expressed as themes throughout the conference; the recommendations were more specific, and were developed at the end of the three days of deliberations.

The Need for Information

Based on the experience of some of the native participants attending the conference, the consensus emerged that native people suffer both from a lack of information about mineral development and from information overload.

In some cases native people lack information about mineral development because they simply do not know that such information exists and is available to them. For example, not all native participants at the conference were aware of the maps and other data available through the Geological Survey of Canada. In other cases, native people were aware that certain information exists, but did not know where it is, or how to get it. The varying responsibilities of the federal and provincial governments related to natural resources complicates the matter of access to information. It was also pointed out that sometimes companies have information which might be of interest, but that they may not be aware that native people have an interest in receiving it.

A further problem is not so much access to information as using it. The Lalande/Clark presentation and comments made by other participants at the conference made it abundantly clear that a wealth of information is available. Some native participants noted that they have obtained large quantities of maps and other materials about mineral potential, exploration activities, and proposed developments in their area. The difficulty then encountered was to interpret this information.

The need for experts to assist native people in obtaining and then interpreting information, and in dealing with development raised a philosophical question. Who should be responsible for providing such expertise: native people themselves, or governments? The question of continued native reliance on government assistance cuts across many issues. In this case, conference participants debated whether native people should continue to rely on government offices such as the Indian Mineral Directorates for assistance, or should adopt a new approach aimed at developing their own expertise in mineral activities.

The Need for Education

Beyond the need for information, participants identified the need for new types of education. First, it was thought that native people need to acquire technical skills and training to participate in direct employment at mines and spinoff enterprises. Second, and equally as important, was the need for management training. Acquisition of management skills was seen as an avenue for advancement in employment, for successful spinoff businesses, and also as an accomplishment which would allow native people to deal on a more equal footing with industry as new developments are proposed.

In addition to general training and skills development, it was also thought to be worthwhile for native people to obtain a better understanding of industry practices and perceptions. Such an understanding would better equip native people to deal with industry, and possibly with government.

Education of nonnative staff within mining companies in native perceptions, goals, lifestyles etc. was seen to be equally as important as skills education for native people. As mentioned previously, senior company officials very often have very little knowledge or understanding of native interests or practices. Accordingly, to facilitate fruitful discussions between native bands or groups and companies proposing a mineral development, native leaders themselves may have to undertake an education effort with senior company officials. Existing company employees may need to be educated about native interests and ways as well. This was seen as crucial to the success of native employment, both in instances where there is special native employment program and, as in Detour Lake, where there is not.

Whether they were discussing strategies for participation in future development among themselves, or with companies, some participants thought that native people should use the success stories of native participation as a selling point to illustrate their rapid and positive adaptation to industrial society.

Recommendations Concerning Possible Follow-Up to the Conference

At the conclusion of the conference, participants agreed on five recommendations for possible follow-up to the conference. These recommendations related to overall government policy, the organization of native participation in mineral development, and native/company relations.

The recommendations related to overall government policy were:

1. that a independent review be conducted of federal government minerals policy as it relates to Indians;
2. that federal/provincial issues regarding the ownership of minerals on Indian reserves in provinces other than the prairies be clarified.

The recommendations related to native participation in mineral development were:

3. that a native institution be established to gather information and provide expertise on mineral development activities to native people;
4. that a handbook be prepared for native people outlining the process of mineral exploration and development in Canada and sources of relevant information.

The recommendation concerning native/company relations was that:

5. a second conference or series of conferences be held on the topic of native participation in mineral development, with more emphasis on participation by native people and companies and less emphasis on participation by government.

Appendix I Program

BACKGROUND SESSIONS

Tuesday March 27

7:00 p.m. **Canada's Mineral Endowment**
Al Clark and Marc Lalande, Energy, Mines and Resources

Wednesday March 28

9:00 a.m. **Native Perspectives**
Katherine Graham, Centre for Resource Studies

Response
Archie Patrick, Lac Labine Band Council

11:00 a.m. **Economic Perspective - Decisions for Exploration, Development, Production and Closure**
Brian Mackenzie, Centre for Resource Studies

NATIVE PARTICIPATION OPTIONS

1:00 p.m. **Influence and Control Through Negotiations and the Regulatory Process**
Connie Hunt, Canadian Institute for Resources Law

Equity Participation Off Reserve
Franc Joubin, Consulting Geologist

Mineral Activities Off Reserve
Terry Daniels, Ghost Lake Resources

7:00 p.m. **Contract Opportunities**
Rosemary Karnes, Dome Petroleum

Thursday, March 29

8:30 a.m. **Panel Discussion - Employment Opportunities**
Clarence Gitzel and Lyle Bear, Amok Ltd.
Earl Laliberté, Nunasi Corporation
Wellington Staats, Six Nations
Ken Hill, Dome Mines

1:00 p.m. Closing discussions and recommendations

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The Centre for Resource Studies (CRS) was established in 1973, under the sponsorship of Queen's University, the federal Department of Energy, Mines and Resources, and The Mining Association of Canada, to carry out a program of research and publication on mineral policy issues.

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